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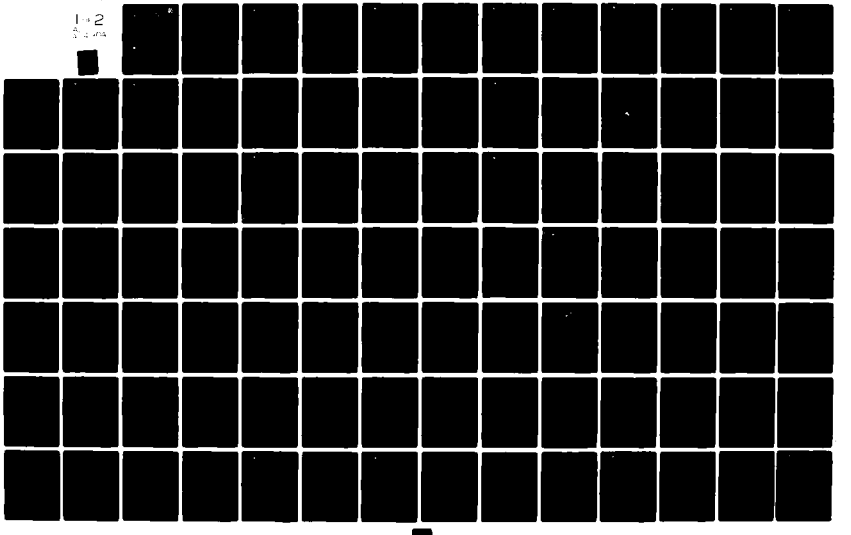

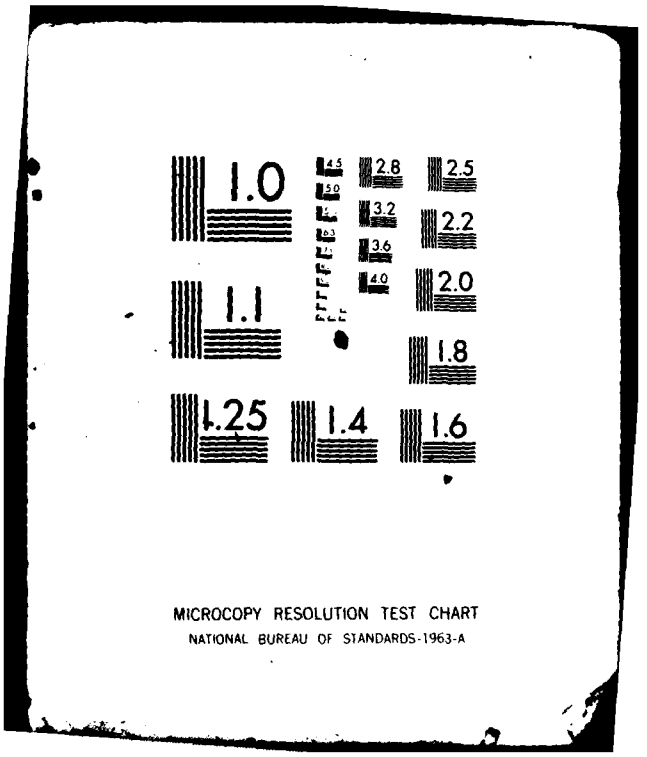

INSTALLATION RESTORATION PROGRAM RECORDS SEARCH

For Westover Air Force Base, Massachusetts

CH2M HILL

Prepared for

AIR FORCE ENGINEERING AND SERVICES CENTER
DIRECTORATE OF ENVIRONMENTAL PLANNING
TYNDALL AIR FORCE BASE, FLORIDA 32403

APRIL 1982

NOTICE

This report has been prepared for the United States Air Force by CH2M HILL SOUTHEAST, INC., for the purpose of aiding in the implementation of the Air Force Installation Restoration Program. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency, the United States Air Force, or the Department of Defense.

INSTALLATION RESTORATION PROGRAM RECORDS SEARCH

For

WESTOVER AIR FORCE BASE, MASSACHUSETTS

Prepared for

AIR FORCE ENGINEERING AND SERVICES CENTER
DIRECTORATE OF ENVIRONMENTAL PLANNING
TYNDALL AIR FORCE BASE, FLORIDA 32403

By

CH2M HILL
Gainesville, Florida

April 1982

Contract No. F08637 80 G0010 0011

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FOREWORD

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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS USED IN THE TEXT

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AFB	Air Force Base
AFESC	Air Force Engineering and Services Center
AFRES	Air Force Reserve
AFSPPF	Air Force Special Products Production Facility
AGE	Aerospace Ground Equipment
AVGAS	Aviation Gasoline
Bldg.	Building
CE	Civil Engineering
cm/s	Centimeters per Second
COD	Chemical Oxygen Demand
CSG	Combat Support Group
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DoD	Department of Defense
DPDO	Defense Property Disposal Office
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
ETAC	Environmental Technical Application Center
°F	Degrees Fahrenheit
ft/min	Feet per Minute
gal/mo	Gallons per Month
gpm	Gallons per Minute
gpy	Gallons per Year
hr	Hour
in	Inches
IRP	Installation Restoration Program
IWTP	Industrial Waste Treatment Plant
JP	Jet Petroleum
kt.	Knots
lb/mo	Pounds per Month
lb/yr	Pounds per Year
MAC	Military Airlift Command
MATS	Military Air Transport Service

LIST OF ACRONYMS, ABBREVIATIONS,
AND SYMBOLS USED IN THE TEXT--Continued

Max.	Maximum
MEK	Methyl Ethyl Ketone
mg/l	Milligrams per Liter
mgd	Millions Gallons per Day
Min.	Minimum
mo.	Month
MMWEC	Massachusetts Metropolitan Wholesale Electric Company
MOGAS	Motor Gasoline
mph	Miles per Hour
msl	Mean Sea Level
NATS	Naval Air Transport Service
N	North
NDI	Non-Destructive Inspection
No.	Number
NPDES	National Pollutant Discharge Elimination System
OEHL	Occupational and Environmental Health Laboratory
%	Percent
PCBs	Polychlorinated Biphenyls
POL	Petroleum, Oil, and Lubricants
ppm	Parts per million
RCRA	Resource Conservation and Recovery Act
SAC	Strategic Air Command
sf	Square Foot (feet)
SSW	South-Southwest
TAC	Tactical Air Command
TAW	Tactical Airlift Wing
TCE	Trichloroethylene
TOC	Total Organic Carbon
USAF	United States Air Force
WNW	West-Northwest

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

A. INTRODUCTION

1. CH2M HILL was retained by the Air Force Engineering and Services Center (AFESC) on August 27, 1981 to conduct the Westover Air Force Base (AFB) records search under Contract No. F08637 80 G0010 0011.

2. Department of Defense (DoD) policy was directed by Defense Environmental Quality Program Policy Memorandum 81-5 dated 11 December 1981 and implemented by Air Force message dated 21 January 1982 as a positive action to ensure compliance of Air Force installations with the existing environmental regulations. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the Installation Restoration Program. The purpose of DoD policy is to identify and fully evaluate suspected problems associated with past hazardous material disposal sites on DoD facilities, control the migration of hazardous contamination from such facilities, and control hazards to health and welfare that may have resulted from these past operations.

3. To implement the DoD policy, a four-phase Installation Restoration Program has been directed. Phase I, the records search, is the identification of potential problems. Phase II (not part of this contract) consists of follow-on field work as determined from Phase I. Phase IIa consists of a preliminary survey to confirm or rule out the presence and/or migration of contaminants. If the Phase IIa work confirms the presence and/or migration of contaminants, then Phase IIb field work would

be conducted to determine the extent and magnitude of the contaminant migration. Phase III (not part of this contract) consists of a technology base development study to support the development of project plans for controlling migration or restoring the installation. Phase IV (not part of this contract) includes those efforts which are required to control identified hazardous conditions.

4. The Westover AFB records search included a detailed review of pertinent installation records, contacts with 11 government and private agencies for documents relevant to the records search effort, and an onsite base visit conducted by CH2M HILL during the week of November 16 through November 19, 1981. Activities conducted during the onsite base visit included interviews with 22 past and present base employees, and ground tours of base facilities to identify past disposal areas. The installations addressed in the records search include Westover AFB and the Granby Transmitter Site.

B. MAJOR FINDINGS

1. The majority of the industrial operations at Westover AFB involving hazardous chemicals and wastes have been in existence since 1941 and include general aircraft maintenance, pneudraulics repair, AGE maintenance, battery shop activities, propulsion shop activities, and wheel and tire maintenance. After SAC assumed control of the base in 1955, several more major industrial operations were activated, including aircraft corrosion control, avionics maintenance, and the NDI lab activities. Since no large-scale industrial operations have been conducted at Westover AFB,

the quantities of waste oils, solvents, paint residues, and thinners generated have been small, in comparison to those at bases having significant aircraft overhaul and maintenance missions. The standard procedures for disposition of the majority of waste oils have been (1) fire training exercises (1941-1974); (2) storage at Defense Property Disposal Office (DPDO) and sale to private contractors (1974 to present). Practices for the disposition of waste solvents have included (1) fire training exercises (1941-1974); (2) treatment at the Industrial Waste Treatment Plant (IWTP) and discharge to the sanitary sewer for further treatment before discharge to a receiving stream (1956-present); and (3) collection and storage at DPDO and contractor disposal at an approved off-base site (October 1981 to present).

2. Interviews with 22 past and present base employees resulted in the identification of 15 past disposal or spill sites and the approximate dates that these sites were used. These sites include four former landfills, two former and one current fire department training areas, three leaching pits, one low-level radioactive waste disposal site, the site of the former sewage treatment plant, one former incinerator site, one construction rubble site, and the site of the Industrial Waste Treatment Plant.

3. In general, the landfills were used for the disposal of incinerator ash and residue, ashes from the coal-fired heating plant, domestic refuse, and general base refuse. Interviewees reported that one former landfill (Site No. 1) received empty containers and 55-gallon drums from industrial operations. There is a potential that some of the

containers and drums contained residual liquid and may have contained (unconfirmed) paint residues and thinners, phenolic paint strippers, methyl ethyl ketone (MEK), trichloroethylene (TCE), o-dichlorobenzene, and other miscellaneous aircraft cleaning compounds. Leaded fuel tank sludges and leaded fuel filters were also disposed of in some of the above areas.

C. CONCLUSIONS

1. No direct evidence was found to indicate the migration of hazardous contaminants beyond the Westover AFB property lines.

2. Small quantities of hazardous wastes have been disposed of in base landfills in the past.

3. A potential exists for migration of pollutants due to (1) high ground-water table, (2) permeable soil conditions, (3) the absence of continuous impermeable confining strata in the unsaturated zone above the water table, and (4) high net precipitation.

4. Although no imminent hazardous sites were identified, the following site was designated as the area showing the most significant potential for contaminant migration.

   o Site No. 1 (Sanitary Landfill B)

     Site No. 1, shown on Figure 7, was used for the disposal of domestic refuse and general base refuse such as empty containers and empty 55-gallon drums from industrial operations

during the period from 1960 until 1974. There is a potential that some of the containers and drums contained residual liquid and may have contained (unconfirmed) paint residues and thinners, phenolic paint strippers, MEK, TCE, o-dichlorobenzene, and other miscellaneous aircraft cleaning compounds. There is a potential that this site received leaded sludge from fuel tank bottoms and leaded fuel filters. Site No. 1 is known to contain medium quantities of hazardous wastes, and indirect evidence of leachate migration was observed in an area adjacent to the site's southern boundary. The northern perimeter of the site ranged from 100 feet to 500 feet from the installation boundary. The depth to ground water is 10 to 15 feet, and the general direction of ground-water movement through the permeable soil is toward the installation boundary.

5. The remaining sites are not considered to pose a significant hazard for migration of contaminants.

D. RECOMMENDATIONS

1. To verify that hazardous contaminant migration is not a problem at Site No. 1, a limited Phase II program is advisable. The recommended program includes the following:

   o Installation of a total of four monitoring wells, three downgradient wells and one upgradient well, along the installation boundary to the north and northeast of Site No. 1 to determine if hazardous contaminants

are migrating off the installation boundary. The wells should be analyzed for pH, COD, TOC, oil and grease, phenol, volatile organic compounds (including TCE, o-dichlorobenzene, and MEK), lead, and iron.

- o Sampling of the potable water well located at the antenna farm and the abandoned well located at the old kennel farm (Facility 8871) at least once and analysis for the above parameters.

2. A pressure test of the 6,000-gallon underground POL waste storage tank located at the Industrial Waste Treatment Plant (Facility 7052) should be conducted to determine if the tank is leaking.

3. Details of the program outlined above, including the exact location of monitoring wells, should be finalized as part of the Installation Restoration Program (IRP) Phase II program. In the event that contaminants are detected in the water samples collected from any of the wells, a more extensive field survey program should be implemented to determine the extent of the contaminant migration. The Phase II contractor should be responsible for evaluating the results of the program outlined above and for recommending additional monitoring, as appropriate. Since no imminent hazard has been determined, there is no immediate urgency to conduct the above Phase II program, which can be implemented as financial resources become available.

I. INTRODUCTION

I. INTRODUCTION

A. Background

The primary legislation governing the management and disposal of solid waste is the Resource Conservation and Recovery Act (RCRA) of 1976. Regulations and implementing instructions for the Act are continuing to be developed by EPA. Under RCRA Section 3012 (Public Law 96-482, October 21, 1981) each state is required to inventory all past and present hazardous waste disposal sites. Section 6003 of RCRA requires Federal agencies to assist EPA and make available all requested information on past disposal practices. It is the intent of the Department of Defense (DoD) to comply fully with these as well as other requirements of RCRA. Simultaneous to the passage of RCRA, the DoD devised a comprehensive Installation Restoration Program (IRP). The purpose of the IRP is to identify, report, and correct environmental deficiencies from past disposal practices that could result in ground-water contamination and probable migration of contaminants beyond DoD installation boundaries. In response to RCRA and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, the DoD issued Defense Environmental Quality Program Policy Memorandum 81-5 (DEQPPM 81-5) on 11 December 1981, which was implemented by Air Force message dated 21 January 1982. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the Installation Restoration Program.

To conduct the Installation Restoration Program records search for Westover AFB, the AFESC retained CH2M HILL on August 27, 1981 under Contract No. F08637 80 G0010 0011. The installations included in the records search are Westover AFB and one off-base facility, the Granby Transmitter Site. The location map of Westover AFB is shown on Figure 1, and the site map of Westover AFB is shown on Figure 2.

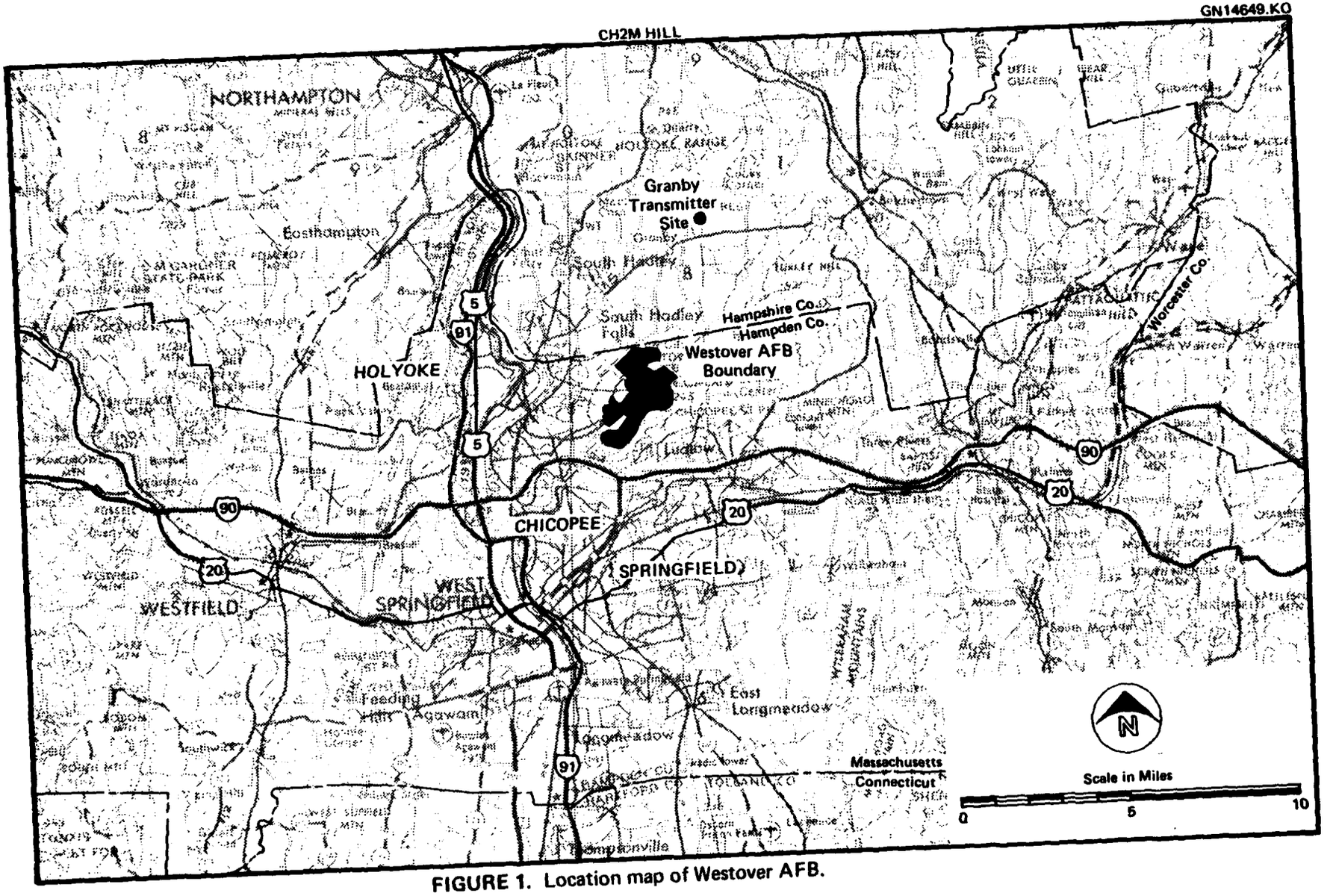

FIGURE 1. Location map of Westover AFB.

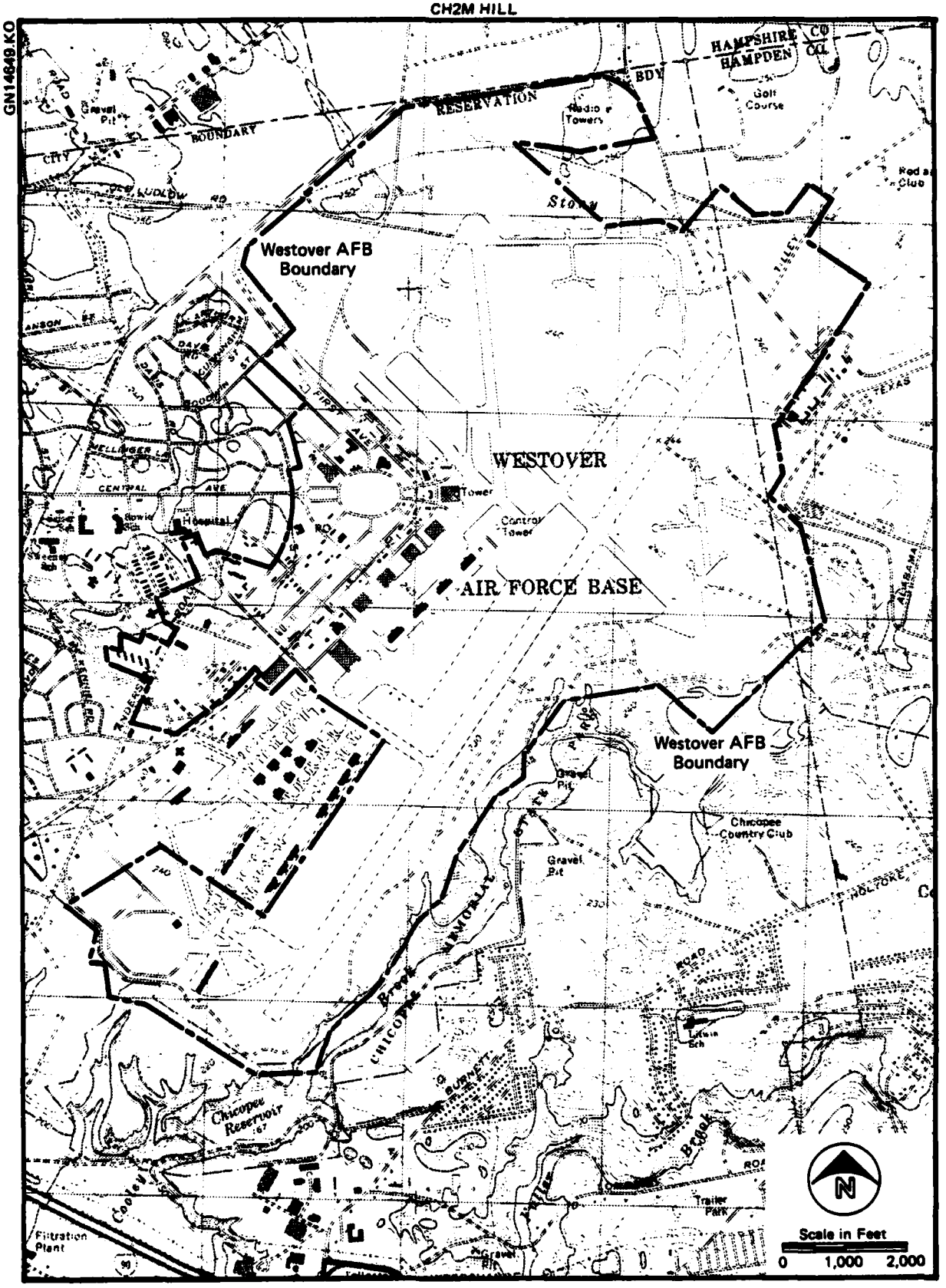

FIGURE 2. Site map of Westover AFB.

The records search comprises Phase I of the Department of Defense (DoD) Installation Restoration Program and is intended to review installation records to identify possible hazardous waste-contaminated sites and to assess the potential for contaminant migration from the installation. Phase II (not part of this contract) consists of follow-on field work as determined from Phase I. Phase IIa consists of a preliminary survey to confirm or rule out the presence and/or migration of contaminants. If the Phase IIa work confirms the presence and/or migration of contaminants, then Phase IIb field work would be conducted to determine the extent and magnitude of the contaminant migration. Phase III (not part of this contract) consists of a technology base development study to support the development of project plans for controlling migration or restoring the installation. Phase IV (not part of this contract) includes those efforts which are required to control identified hazardous conditions.

B. Authority

The identification of hazardous waste disposal sites at Air Force installations was directed by Defense Environmental Quality Program Policy Memorandum 81-5 (DEQPPM 81-5) dated 11 December 1981, and implemented by Air Force message dated 21 January 1982, as a positive action to ensure compliance of Air Force installations with existing environmental regulations.

C. Purpose of the Records Search

DoD policy is to identify and fully evaluate suspected problems associated with past hazardous material disposal sites and spill sites on DoD facilities, control the migration of hazardous contamination from such facilities, and control hazards to health or welfare that may have resulted from these past operations. The potential for migration of

hazardous material contaminants was evaluated at Westover AFB by reviewing the existing information and conducting an analysis of installation records. Pertinent information includes the history of operations, the geological and hydrogeological conditions which may contribute to the migration of contaminants off the installation, and the ecological settings which indicate sensitive habitats or evidence of environmental stress resulting from contaminants.

D. Scope

The records search program included a pre-performance meeting, a preliminary coordination meeting, an onsite base visit, a review and analysis of the information obtained, and preparation of this report.

The pre-performance meeting was held at Westover AFB, Massachusetts, on September 29, 1981. Attendees at this meeting included representatives of AFESC, AFRES, Westover AFB, and CH2M HILL. The purpose of the pre-performance meeting was to provide detailed project instructions, to provide clarification and technical guidance by AFESC, and to define the responsibilities of all parties participating in the Westover AFB records search.

A CH2M HILL representative conducted a preliminary visit to Westover AFB on November 12, 1981 to become familiar with the installation and to prepare for the records search team base visit.

The onsite base visit was conducted by CH2M HILL from November 16 through November 19, 1981. Activities performed during the onsite visit included a detailed search of installation records, ground tours of the installation, and interviews with 22 past and present base personnel. At the conclusion of the onsite base visit, an outbriefing was held with the

Commander of the 439th Combat Support Group and members of his staff to discuss preliminary findings. The following individuals comprised the CH2M HILL records search team:

1. Mr. James Hawley, Project Manager (M.S. Sanitary Engineering, 1964)

2. Mr. Greg McIntyre, Assistant Project Manager (M.S. Environmental and Water Resources Engineering, 1981)

3. Mr. Stephen Hahn, Hydrogeologist (M.S. Civil Engineering, 1973)

4. Mr. Brian Winchester, Ecologist (B.S. Wildlife Ecology, 1973)

Resumes of these team members are included in Appendix A. Eleven government and private agencies were contacted for information and relevant documents. Appendix B lists the agencies contacted.

Individuals from the Air Force who assisted in the Westover AFB records search included the following:

1. Mr. Bernard Lindenberg, AFESC, Program Manager, Phase I

2. Mr. Myron Anderson, AFESC, Environmental Engineer

3. Mr. Larry Garrett, AFRES, Command Representative

4. Mr. Joseph Golas, Westover AFB, Base Environmental Coordinator

5. Mr. Paul Gagnon, Westover AFB, Civil Engineer

6. Major Gary Fishburn, USAF OEHL, Program Manager, Phase II

E. Methodology

The methodology utilized in the Westover AFB records search is shown graphically on Figure 3. First, a review of past and present industrial operations is conducted at the base. Information is obtained from available records such as shop files and real property files, as well as interviews with past and present base employees from the various operating areas of the base. A list of 22 interviewees from Westover AFB, with areas of knowledge and years at the installation, is given in Appendix C.

The next step in the activity review process is to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from all the industrial operations on the base. Included in this part of the activity review is the identification of all past landfill sites and burial sites; as well as any other possible sources of contamination such as major PCB or solvent spills, or fuel-saturated areas resulting from large fuel spills or leaks.

A general ground tour of identified sites is then made by the records search team to gather site-specific information including evidence of environmental stress and the presence of nearby drainage ditches or surface-water bodies. These water bodies are inspected for any evidence of contamination or leachate migration.

A decision is then made, based on all of the above information, whether a potential exists for hazardous material contamination from any of the identified sites. If not, the

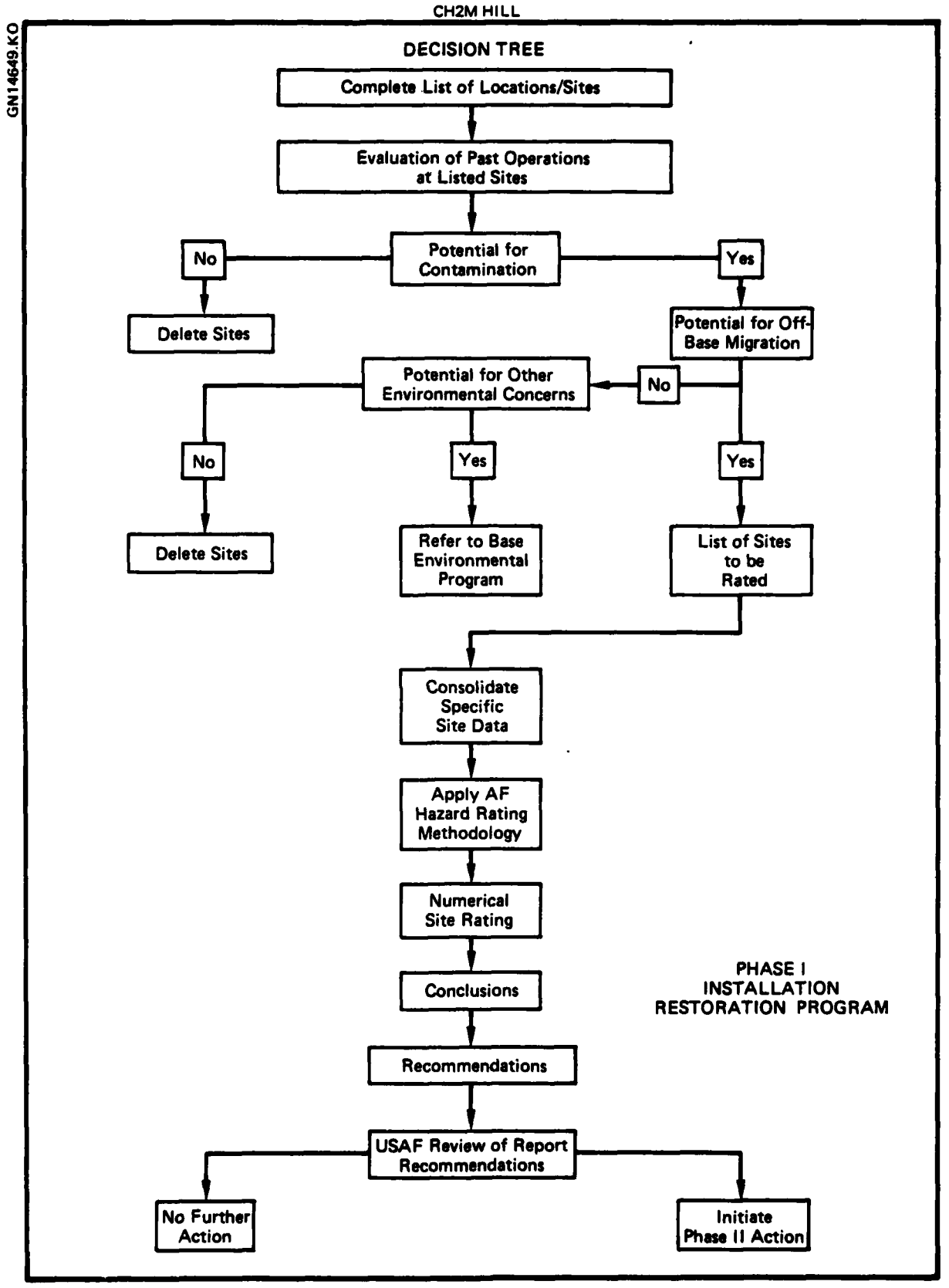

FIGURE 3. Records search methodology.

site is deleted from further consideration. If minor operations and maintenance deficiencies are noted during the investigations, the condition is reported to the Base Environmental Coordinator for remedial action.

For those sites in which potential contamination is identified, the potential for migration of this contamination across installation boundaries is evaluated by considering site-specific soil and ground-water conditions. If there is potential for on-base contaminant migration or other environmental concerns, the site is referred to the Base Environmental Coordinator for further action. If no further environmental concerns are identified, the site is deleted from consideration. If the potential for off-base contaminant migration is considered significant, then the site is rated and prioritized using the site rating methodology described in Appendix J, "Hazard Assessment Rating Methodology."

The site rating indicates the relative potential for environmental impact at each site. For those sites showing a significant potential, recommendations are made to quantify the potential contaminant migration problem under Phase II of the Installation Restoration Program. For those sites showing a low potential, no Phase II work would be recommended.

II. INSTALLATION DESCRIPTION

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A. Location

Westover AFB is located on 2,368 acres of land adjacent to the City of Chicopee, Massachusetts. The City of Chicopee is located in northern Hampden County in the Connecticut River Valley. The towns of South Hadley, Granby, Ludlow, and West Springfield, and the cities of Springfield and Holyoke are located near the base. The location map of Westover AFB is shown on Figure 1. Westover AFB supports one off-base installation, the Granby Transmitter Site.

B. Organization and Mission

Construction and activation of Westover AFB began in April 1940. During the 1940's, Westover served as a training center for fighter pilots, anti-submarine crews, and B-17, B-24, and B-26 bomber crews. In 1946, Westover was transferred to the Air Transport Command, which became the Military Air Transport Service (MATS) in 1948. In 1955, the Strategic Air Command (SAC) assumed control of the base and the installation developed rapidly into the largest SAC facility in the eastern United States.

As of April 1, 1974, the active duty role of Westover AFB came to an end and on May 1, 1974, the base officially became the operating responsibility of the United States Air Force Reserve. In the years following 1974, the deactivation of the base resulted in approximately 2,250 acres of the original 4,800 acres being declared surplus and excessed. Excessed property was released to the Cities of Chicopee and Ludlow, and its development is the responsibility of the Westover Metropolitan Development Corporation. Although some of the facilities active during SAC's tenure have been demolished, the majority of the facilities on base remain in existence either in a functional or "mothballed" state.

The current host unit at Westover AFB is the 439th Tactical Airlift Wing (TAW). The mission of the 439th TAW is to organize, recruit, and train Air Force reservists while maintaining operationally ready aircraft, crews, and support personnel. The aircraft currently assigned to Westover AFB are the C-123 and C-130. There are 16 of the C-123 and 12 of the C-130 aircraft currently on base. The total work force on Westover AFB numbers 3,537 people, including 698 civilians and 2,839 reserves, of whom 204 are air reserve technicians and 2,635 are unit training assembly reserves.

Westover AFB is operated and maintained by the 439th Combat Support Group (CSG). The mission of the 439th CSG is extremely diverse and includes: direction, maintenance, and supervision of airfield activities, including base operations; operation of on-base transportation services and equipment; operation of fire fighting and security services; operation of the military Consolidated Base Personnel Office and Central Civilian Personnel Office; and performance of other support functions.

The major organizations and tenants at Westover AFB are listed below:

- 731st and 337th Tactical Airlift Squadrons (Reserve)
- 901st and 905th Consolidated Aircraft Maintenance Squadrons (Reserve)
- 58th and 59th Mobile Aerial Port Squadrons (Reserve)
- 901st and 905th Mobile Aerial Port Flights (Reserve)
- 74th Aeromedical Evacuation Squadron (Active U.S. Army Tenant)
- 439th Tactical Hospital (Reserve)
- 901st and 905th Mobility Support Flights (Reserve)
- 901st and 905th Communications Flights (Reserve)
- 901st Civil Engineering Squadron and the 905th Civil Engineering Fleet (Reserve)

- 901st and 905th Weapons Systems Security Flights (Reserve)
- Detachment 5, 1st Aerospace Communications Group (Active)
- Operating Location B, Detachment 6, 26th Weather Squadron, 3rd Weather Wing (Active)
- 1917th Communications Squadron (Active)

A more detailed description of the base history and its mission is included in Appendix D.

III. ENVIRONMENTAL SETTING

III. ENVIRONMENTAL SETTING

A. Meteorology

Westover AFB is located in the North Atlantic Lowlands Region situated between the Appalachian Mountains and the Atlantic Ocean. Although the region is partially sheltered from extremes of weather that occur west of the mountains, most air masses, fronts, and storms cross these mountains with little change in intensity. Storm systems moving northeast from the Gulf of Mexico or along the Atlantic coast and cold fronts and storms moving over the mountains from the west bring most of the precipitation for the region. In winter, arctic and polar air masses frequently bring snowstorms and very low temperatures. Storms travelling along the Atlantic coast also can bring heavy snowfall (Baldwin, 1973).

Meteorological data have been collected from the Westover AFB weather station since 1941 and are summarized in Table 1. The average annual temperature is approximately 49°F. The average annual relative humidity is 69 percent (based on observations at 0400 and 1300 hours). Rainfall and snowfall average 37 inches and 49 inches per year, respectively. Total precipitation (rainfall plus snowfall) averages 42 inches per year. Lake evaporation is about 30 inches per year and is an approximation of the evapotranspiration rate in the area. Actual evapotranspiration rates over land areas may be greater or less than this value depending on vegetative cover type.

There were 28 tornadoes reported during the period 1955-1967 within the 1-degree square in which Westover is located (Pautz, 1969). A total of 27 windstorms of 57 miles per hour (mph) and greater were also recorded for this 1-degree square during the period 1955-1967 (Pautz, 1969).

Table 1
METEOROLOGICAL DATA SUMMARY FOR WESTOVER AFB (1941-1967)

		Temperature (°F)			Precipitation (in)				Wind (knots)			Mean			
Month	Ext Max	Mean Daily Max	Mean Daily Min	Ext Min	Mean Total	Max in 24 Hr	Mean Snowfall	Max Snowfall 24 Hr	Prevailing Direction	Mean Speed	Extreme (Peak) Speed (Gusts)	Relative Humidity (%) 0400	Relative Humidity (%) 1300	Dew Point (°F)	Vapor Pressure (in of Hg)
Jan.	65	34	16	-22	3.3	1.9	14	9	N	8	55	74	62	16	0.09
Feb.	65	36	18	-18	3.1	3.3	12	17	WNW	8	56	74	59	17	0.10
March	86	45	27	-13	3.4	1.6	11	11	WNW	8	60	76	57	25	0.14
April	90	58	36	8	3.9	3.6	1	5	SSW	8	61	78	50	34	0.20
May	101	70	46	28	3.5	2.1	Trace	Trace	SSW	8	58	84	49	45	0.30
June	102	78	55	32	3.6	2.4	0	0	S	7	49	87	52	55	0.44
July	97	83	61	44	3.7	2.4	0	0	S	6	48	89	52	60	0.52
Aug.	100	81	58	37	3.7	7.6	0	0	S	6	62	90	54	59	0.50
Sept.	101	73	51	25	3.4	3.9	0	0	S	6	60	90	55	53	0.40
Oct.	89	64	41	17	2.9	3.4	Trace	1	SSW	7	49	85	53	42	0.27
Nov.	81	50	32	8	4.2	2.4	1	6	S	7	69	81	60	32	0.18
Dec.	64	36	19	-16	3.5	2.1	10	13	WNW	7	54	76	63	20	0.11
Ann.	102	59	39	-22	42.2	7.6	49	17	S	7	69	82	56	38	0.23
Years of Record	24	24	24	24	24	24	20	20	26	26	14	26	26	26	26

Source: Westover AFB Climatic Brief.

The peak wind gust reported for Westover AFB for the period 1941-1967 was 79 mph. For a typical year there are approximately 1 to 2 days during which hail occurs (Baldwin, 1973), 8 to 12 days during which freezing rain occurs (Baldwin, 1973), and 24 days during which thunderstorms occur (ETAC, 1970).

During the period 1901-1930 four hurricanes crossed the New England mainland and four others passed nearby. During 1931-1960, 19 hurricanes crossed New England and 19 others influenced the local weather; from 1961 through 1975, there were three crossings and 11 near passages. On the average, it can be expected that a hurricane will cross the New England mainland once every 3 years and will pass nearby on an average of once per year. Tracks of major 20th century hurricanes which were within approximately 50 miles of Westover AFB are 'New England' (1938), 'Carol' (1954), and 'Donna' (1960) (Ludlum, 1976).

B. Geology

Westover Air Force Base is located in the Connecticut River Valley, at a point where the valley is approximately 25 miles wide. The valley has north-south trending bluffs; the eastern bluffs are approximately 660 feet above mean sea level (msl), and the western bluffs are approximately 1,100 feet above msl. Ground surface elevations at Westover AFB range from approximately 200 to 250 feet above msl.

The eastern portion of the Connecticut River Valley is underlain by crystalline bedrock (gneiss and schist). However, bedrock beneath Westover AFB and the western portion of the valley consists of sandstone and shales deposited during the Triassic (approximately 200 million years ago). The Triassic bedrock surface occurs at an approximate elevation of 75 feet above msl at Westover AFB, which is approximately

125 to 175 feet below the ground surface. A typical east-west trending cross section through the Connecticut River Valley is shown on Figure 4.

Various types of sediments have been deposited on top of the Triassic bedrock surface, filling in the lower portion of the valley, as illustrated on Figure 4.

Immediately overlying the bedrock surface is a thin, (less than 10-foot thick) layer of till deposited during the Pleistocene. The thickness and composition of the till layer vary considerably. Some isolated till lenses are very permeable, as discussed later.

On top of the till layer are lake bottom deposits, also deposited during the Pleistocene, when the Connecticut River Valley was dammed by glacial drift near Rocky Hill, Connecticut. This dam backed up a huge reservoir known as Lake Hitchcock, extending as far north as Lyme, New Hampshire. Subsequently, most of the lake bottom was filled with alternating thin layers (varves) of silt and clay. In the central portion of the Connecticut River Valley (the middle of Lake Hitchcock), these lake bottom deposits are laterally continuous and are about 80 feet thick. Near the valley perimeter, the lake bottom deposits taper and are overlain with coarse-grained (sand and gravel) alluvial terraces and deltas. Westover Air Force Base is located on one such delta.

At Westover AFB, a well drilled at Building 1900 encountered the following sequence of soil and rock formations:

Depth	Material Type
0 - 65 feet	Sand and Gravel
65 - 145 feet	Lake Bottom Deposits (varved silt)
145 - 155 feet	Till
155 - 750+ feet	Triassic Shale

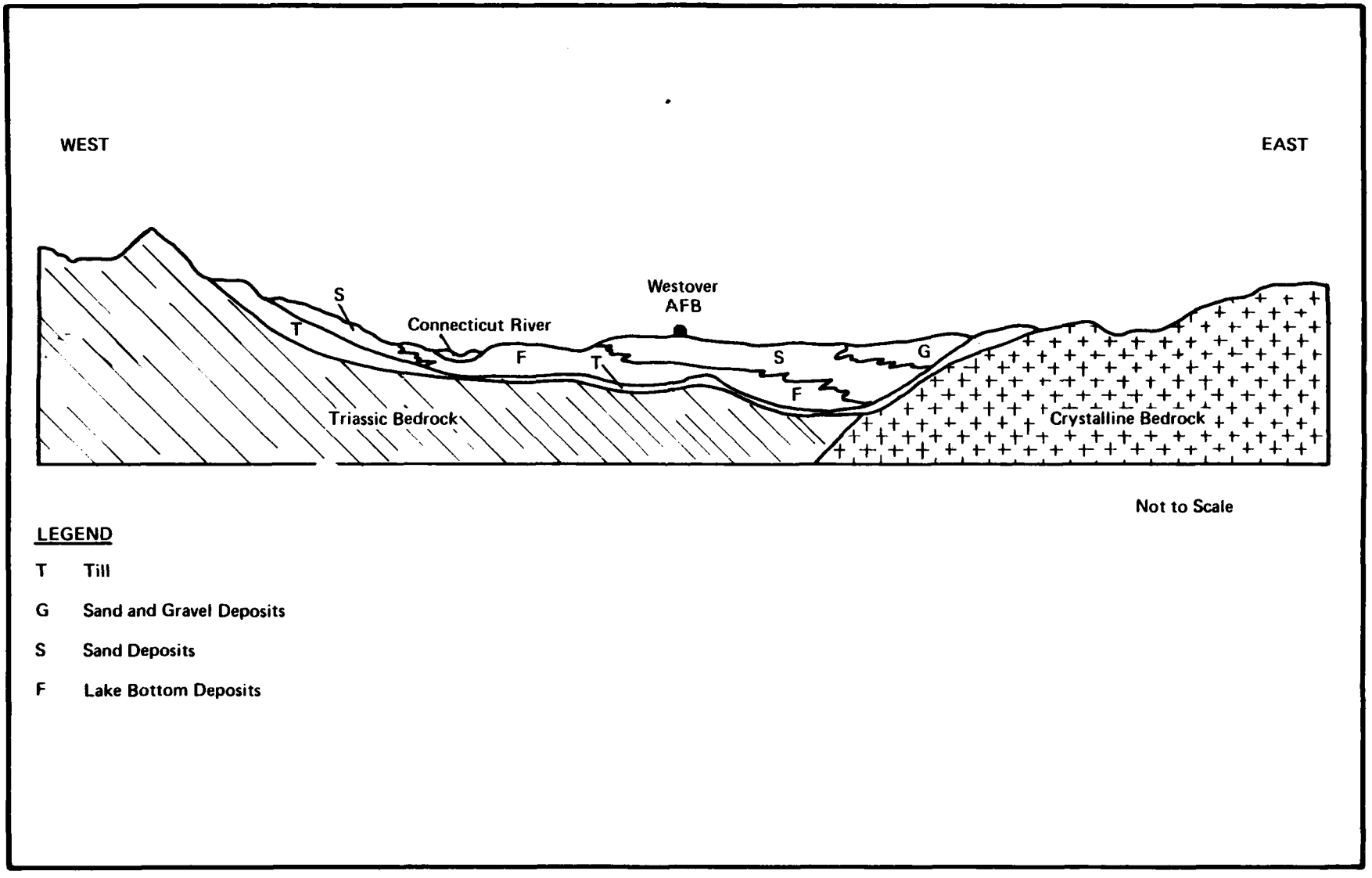

FIGURE 4. Typical geologic section through the Connecticut River Valley.

C. Hydrology

A fairly extensive drainage system consisting of ditches, swales, and storm sewers conveys stormwater runoff from the base into three different brooks: Cooley, Stony, and Willimansett. The water quality designation of all three brooks is Class B. Class B is defined as inland waters suitable for bathing and other primary contact recreation; suitable for agricultural and certain industrial process cooling uses; suitable as an excellent fish and wildlife habitat; and excellent aesthetic value. These brooks eventually discharge into the Connecticut River. The approximate watershed boundaries and directions of flow are shown on Figure 5. Oil/water separators have been installed at the points of discharge of three storm sewers that discharge into Cooley Brook; the locations of the oil/water separators are also shown on Figure 5. These sewers collect runoff from the apron, aircraft maintenance, taxiway, and runway areas. Those areas of the runways and taxiways which are located in the Stony Brook Watershed drain into Stony Brook and not into Cooley Brook.

There are no lakes or ponds on the Air Force property; however, there are some low-lying areas that collect and retain water temporarily until it evaporates or percolates into the ground.

Near Westover AFB, within the city limits of Chicopee, two facilities which have wells used as potable water sources have been identified: a 40-unit apartment building complex located approximately 300 feet east of the intersection of Highway 33 and Ludlow Road, and the antenna farm area on Westover AFB. All other potable water usage in the City of Chicopee is obtained from the municipal water system which is supplied by a surface-water source.

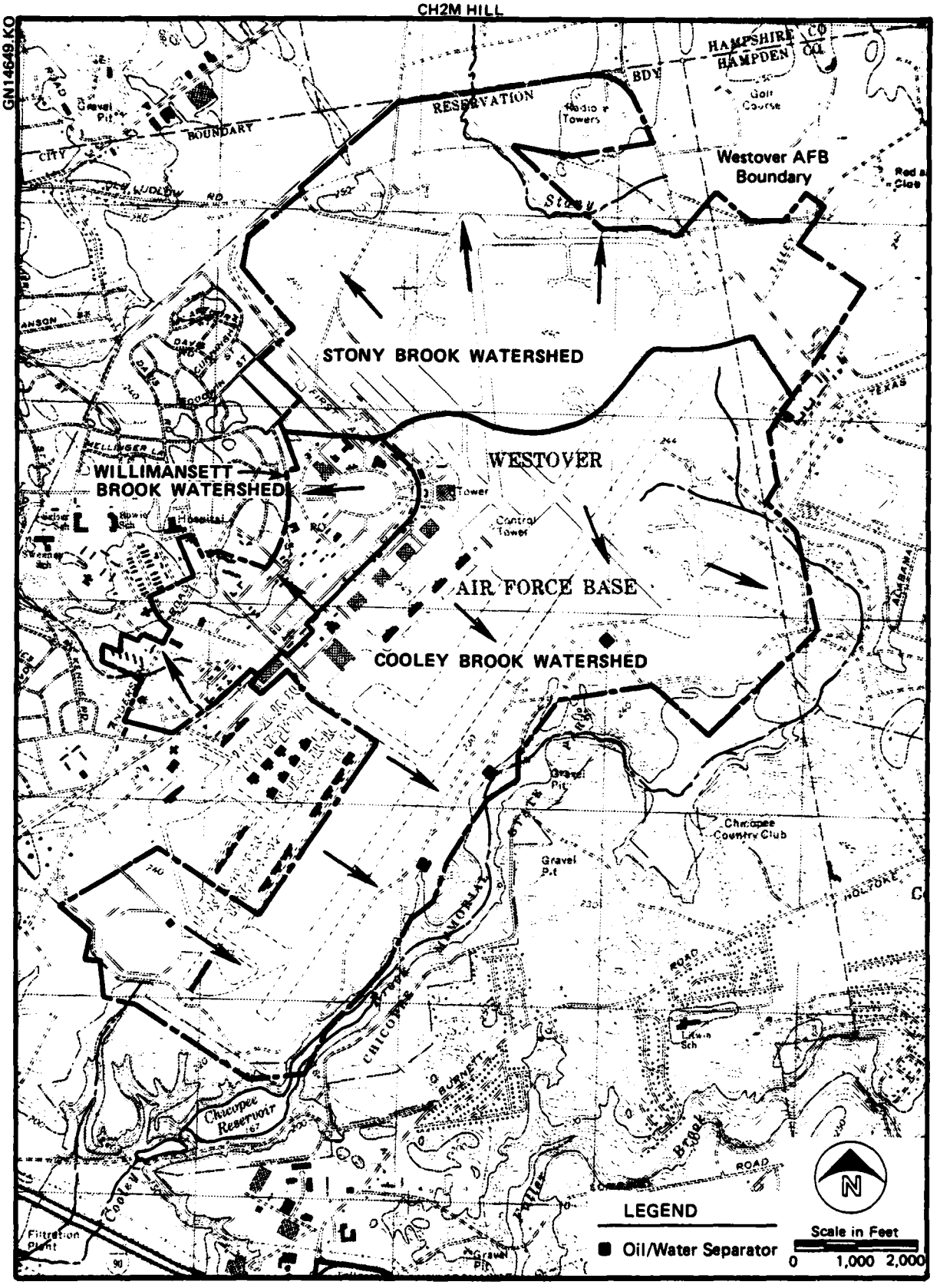

FIGURE 5. Surface drainage map of Westover AFB.

The town of South Hadley also has a municipal water supply system that serves all but a few homes. South Hadley supplements their surface-water supply with ground water obtained from a 110-foot deep, gravel-packed well approximately 10 miles northwest of Westover AFB.

Approximately 150 homes located along New Ludlow Road in the town of Granby are also served by South Hadley's municipal water supply system. The remainder of Granby's population, approximately 5,000 people, use individual wells. Most of these wells have been installed in the till layer or underlying the Triassic bedrock formation. There are a significant number of older homes in Granby that have shallow, "well point-" type wells installed in the near-surface sand and gravel aquifer.

Approximately 75 percent of Ludlow's population is served by the City of Springfield's surface-water supplied municipal water supply system. The remaining population, approximately 4,500 people, use individual wells. Similar to the wells in Granby, the wells in Ludlow include both "bedrock" wells and "well point-" type wells (see Figure 6).

Several bedrock-type wells drilled 14 years ago at Building 1900 have since been abandoned and capped. Yields from these 6-inch-diameter, 700-foot-deep wells were on the order of 100 gallons per minute (gpm). Since no information is available on the integrity of the well casings, the potential that these abandoned wells may act as a pathway for contaminant migration to the deeper aquifer does exist.

Well yields from various ground-water aquifers in the area are estimated as follows:

1. Surficial Sands - Where this layer is greater than 30 feet thick, wells are expected to yield on the order of 25 to 50 gpm.

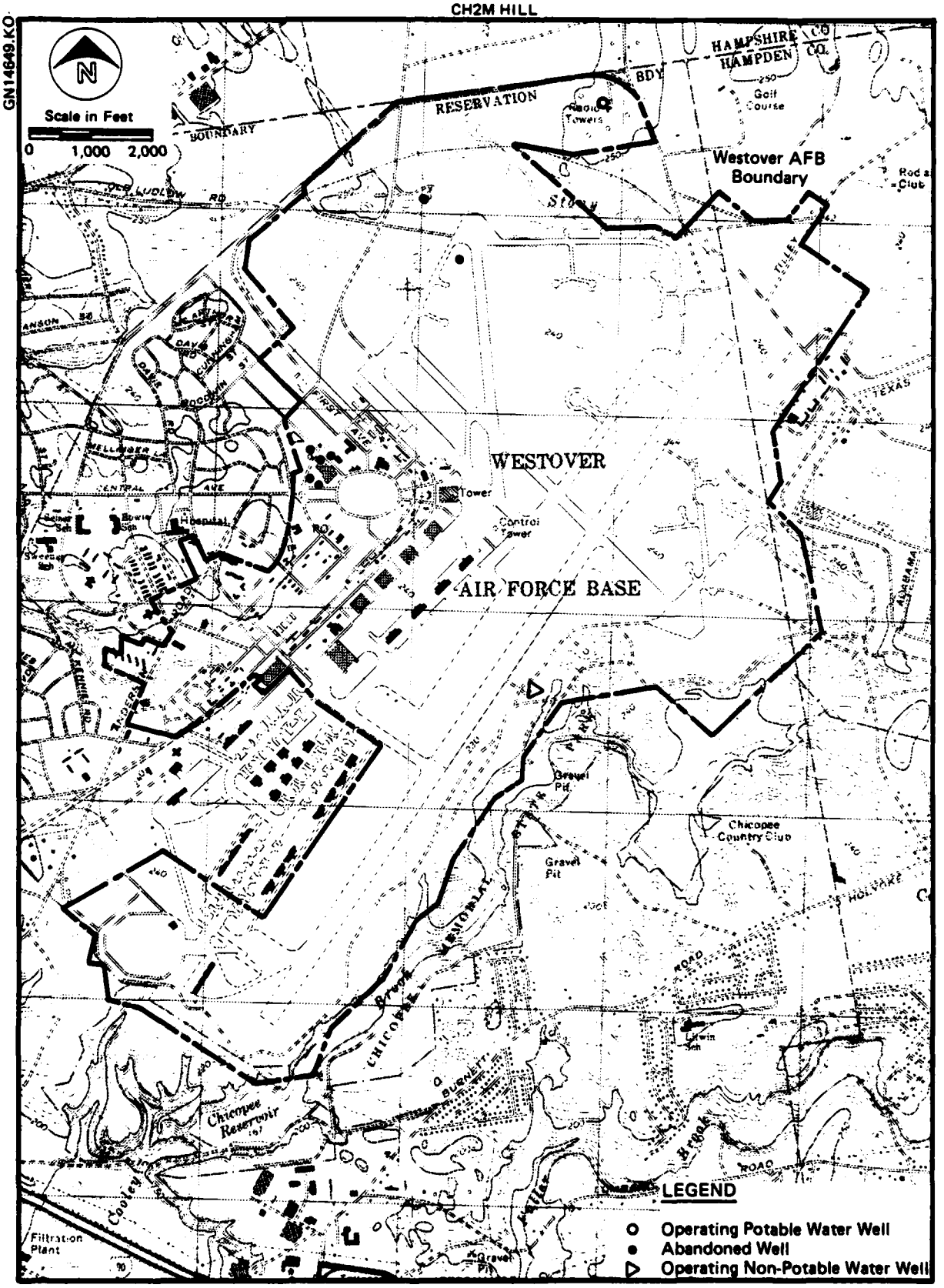

FIGURE 6. Location of water wells at Westover AFB.

2. Till - Well yields vary greatly from one location to the next. A maximum yield of 1,000 gpm has been reported. At other locations, where the till layer is an isolated deposit, well yields are low or non-existent.

3. Triassic Bedrock - Well yields vary from 50 to 300 gpm.

The principal environmental concern is that leachate from landfills at Westover AFB might contaminate the surficial sand aquifer and move to adjacent brooks and ponds and contaminate private "well point-" type wells in Granby and South Hadley. The till and bedrock aquifers are protected from vertical recharge by 80 feet of impervious silt and clay (lake bottom deposits). In the landfill areas identified later, ground water occurs in the surficial sand aquifer at depths ranging from 5 to 15 feet deep. The direction of ground-water movement in this aquifer follows the surface-water drainage patterns as indicated on Figure 5. Therefore, the principal hydrologic concern is leachate movement through the sand layer to adjacent brooks and ponds.

D. Environmentally Sensitive Conditions

1. Vegetation

A number of vegetation studies have attempted to classify the potential climax vegetation within the region of Westover AFB (Braun, 1972; Kuchler, 1975; Barrett, 1962). Vegetation studies conducted in the immediate vicinity of Westover AFB by MMWEC (1978) found the following plant communities: old fields, shrublands, mixed hardwoods, conifer plantations, wet meadows, marshes, and bogs. Of these communities, the last three are considered wetland communities and come under the Massachusetts Wetlands Protection Act, Chapter 131, Section 40 as amended (1979).

This act requires authorization prior to the dredging, filling, or alteration of wetlands and prohibits such activities where the wetland is significant to public or private water supply, to the ground-water supply, to flood control, to storm drainage protection, to prevention of pollution, to protection of land containing shellfish, or to the protection of fisheries.

The MMWEC (1978) descriptions of wet meadows, marshes, and bogs in the vicinity of Westover AFB were as follows:

Wet meadows characteristically have ground water at or near the surface for a significant part of the growing season. Cover in the ground stratum is generally heavy (80 to 85 percent) and the plants are low-growing, seldom more than 2 feet tall. Common plants include water-purslane, blue-joint, mermaid-weed, and various species of sedges, rushes, and spikerush.

Marshes occur adjacent to Stony Brook and in scattered depressions from construction of the military facilities. These depressions contain standing or slowly moving shallow water during most of the growing season. Herbaceous vegetation is generally more than 3 feet tall. Common plants in the ground stratum include common cattail, blue-joint, burreed, sweet-flag, and various species of sedges, rushes, and spikerush.

Bog communities occur in low areas of standing or slowly moving water. Although most of the bogs in the vicinity are relatively undisturbed, some bogs or portions thereof resulted from construction of the military facilities. Scattered red maples in the canopy/subcanopy stratum provide up to 5 percent cover. Many trees are dead or dying, probably from excessive soil moisture and flooding. The shrub cover

is quite heavy and provides 50 to 60 percent cover. Some of the dominant shrubs include highbush cranberry, swamp azalea, common winterberry, holly, and leatherleaf. Sphagnum and water-arum provide an extensive cover in the ground stratum.

2. Wildlife

About 54 species of mammals and 128 species of birds are known to occur in the vicinity of Westover AFB (MMWEC, 1978). Actively hunted game species include white-tailed deer, eastern cottontail, gray squirrel, ring-necked pheasant, American woodcock, common snipe, and mourning dove. Based on a review of species distributions given by Conant (1975), approximately 41 species of reptiles and amphibians occur in the Westover AFB region.

3. Aquatic Biota

A number of small creeks or streams pass through or adjacent to Westover AFB, including Cooley Brook, Stony Brook, and Willimansett Brook. Although all three brooks provide valuable habitat for aquatic biota, Cooley Brook (which parallels the southeastern boundary of Westover AFB) is probably the most important. Its environmental significance is enhanced by the fact that it lies within a state preserve (Chicopee Memorial State Park) and forms the headwaters of recreationally important Chicopee Reservoir. In the lower section of Cooley Brook, below the Chicopee Reservoir, the Massachusetts Division of Fisheries and Game collected 14 fish species, including brook trout, largemouth bass, bluegill, and pumpkinseed. Fish species known to occur in Stony Brook include banded killfish, brown bullhead, pumpkinseed, bluegill, black crappie, and yellow perch (MMWEC, 1978).

4. Endangered Species

No mammals, birds, reptiles, amphibians, or fish listed as endangered or threatened by the U.S. Fish and Wildlife Service are known to occur on or immediately adjacent to Westover AFB. The endangered Indiana bat was last reported from the Chester, Massachusetts, area in 1939 to 1940 (Cardoza, 1977). Bald eagles routinely pass through the state and also summer on Quabbin Reservoir (roughly 25 miles northeast of Westover AFB), but no nesting has occurred since the early 1900's (Cardoza, 1977, Forester, 1977). The endangered peregrine falcon also no longer nests in the state, though efforts are being made to restore this species to its former range. Three young birds were released in 1977 in the Connecticut River Valley within 25 miles of Westover AFB (Forester, 1977).

No plant species listed by the U.S. Fish and Wildlife Service are known to occur on or adjacent to Westover AFB. There is a possibility that the wetland plant golden club (Orontium aquaticum) occurs in some of the bogs directly north of Westover AFB, but this is based on an old (1930) report and has not been recently verified (Feingold, 1981). Golden club is considered rare by the Massachusetts National Heritage Program.

5. Environmental Stress

No evidence of biological stress related to hazardous wastes or materials was noted during site visits to Westover AFB. Vegetation stresses which were noted were all related to physical disturbance (construction, landfill, etc.), changes in surface-water regimes (resulting in flooding stress to vegetation), or wildfire. An orange-colored flocculant material (perhaps a precipitate) was noted on the bottom of most of the brooks on or adjoining Westover AFB.

Such precipitates are typical where soils contain significant amounts of iron compounds. No adverse effects on stream biota were observed.

E. Summary of Environmental Conditions

The approximate geologic profile consists of 65 feet of pervious sand and gravel underlain, in sequence, by 80 feet of varved silt, 10 feet of glacial till and 600 or more feet of sandstone and shale. The greatest potential for migration of contaminants is laterally through the surficial sand and gravel aquifer.

No adverse impacts on biota, wetland communities, aquatic systems, or endangered species were found related to past disposal practices on Westover AFB.

IV. FINDINGS

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A. Activity Review

1. Industrial Operations

The industrial operations at Westover AFB are primarily involved in the routine maintenance of assigned C-123 and C-130 aircraft. Appendix E contains a master list of the industrial operations.

A review of base records and interviews with past and present base employees resulted in the identification of those industrial operations where the majority of industrial chemicals are handled and hazardous wastes are generated. Table 2 summarizes the major industrial operations and includes the estimated quantities of wastes generated as well as the past and present disposal practices of these wastes, i.e., treatment, storage, and disposal. It should be noted that the estimated waste quantities are current quantities while Westover AFB is operating as an AFRES unit. Due to the higher degree of activity during the period that Westover AFB was under the control of SAC (1955-1974), the waste quantities were larger during that period. Information regarding quantities of wastes generated at Westover AFB during SAC control was not available. A description of the major industrial activities follows:

a. Aircraft Maintenance

The aircraft maintenance shop is located in Facility 7072 and has been at this location since 1941. Industrial activities include cleaning operations and general aircraft maintenance. Wastes generated include PD 680 Type II (100 gal/mo), hydraulic oil (24 gal/mo), and engine oil (50 gal/mo). PD 680 Type II is a petroleum distillate

Table 2
MAJOR INDUSTRIAL OPERATIONS SUMMARY

Shop Name	Location (Bldg. No.)	Waste Material	Waste Quantity	Treatment/Storage/Disposal Methods 1950 1960 1970 1980
439 TAW				
Aircraft Maintenance	7072	PD 680 Type II	100 gal/mo.	Transport to IWTP[a]
		Hydraulic Oil	24 gal/mo.	Fire Training & DPDO DPDO[b]
		Engine Oil	50 gal/mo.	
Corrosion Control	7051	Alkaline Cleaning Solution	450 gal/mo.	
		PD 680 Type II	200 gal/mo.	
		Cold Tank Stripper	50 gal/mo.	Drain to IWTP
		Polyurethane Paint Thinner	2 gal/mo.	
		Methyl Ethyl Ketone	4 gal/mo.	
		B&B Chemical 3100	10 gal/mo.	Drain to IWTP
Propulsion	7071	Synthetic Turbine Oil	50 gal/mo.	
		Hydraulic Oil	100 gal/mo.	Fire Training & DPDO DPDO
		Engine Oil	300 gal/mo.	
		Slop Waste (PD 680 Type II, Gasoline, Paint Remover)	50 gal/mo.	
Battery Shop	7072	Battery Acid	50 gal/mo.	Neutralization/Leaching Pit
Fuel Systems	7051	AVGAS	<5 gal/mo.	Fire Training & DPDO DPDO
		JP-4	<5 gal/mo.	
Pneudraulics	7072	Hydraulic Oil	25 gal/mo.	Fire Training & DPDO DPDO
		Preservative Oil	5 gal/mo.	
		PD 680 Type II	10 gal/mo.	Transport to IWTP
Wheel & Tire Shop	7072	PD 680 Type II	10 gal/mo.	Transport to IWTP
Aerospace Ground Equipment (AGE)	7057	Engine Oil	40 gal/mo.	Fire Training & DPDO DPDO

Table 2—Continued

Shop Name	Location (Bldg. No.)	Waste Material	Waste Quantity	Treatment/Storage/Disposal Methods 1950 1960 1970 1980
Non-Destructive Inspection	2426	Glacial Acetic Acid Kerosene Penetrant Emulsifier	1 gal/mo. 4 gal/mo. 8 gal/mo. 8 gal/mo.	Transport to IWTP DPDO

[a]IWTP is located in Building No. 7052; effluent is discharged to the sanitary sewer; floated oils are skimmed off and stored in an underground storage tank; grit and solids are removed and placed in a dumpster.
[b]All wastes brought to DPDO are removed by contractors.

LEGEND

——— Time frame assumed by shop personnel.
——— Time frame confirmed by shop personnel.

used as a safety cleaning solvent. The PD 680 is collected at the shop in 55-gallon drums, then transported to the Industrial Waste Treatment Plant (IWTP) for treatment. A description of the IWTP appears in Section A-8, Page IV-17. The waste hydraulic oil and engine oil is collected and trucked to one of the two 4,000-gallon POL waste storage tanks located at Facility 1833. Final disposition is sale to contractors. Prior to 1974, the final disposition of POL wastes was primarily fire department training or sale to contractors.

b. Corrosion Control

The corrosion control operation is located in Facility 7051 and has been in operation since 1956. Prior to 1956, corrosion control activities took place at the aircraft maintenance shop in Facility 7072. Corrosion control activities include sanding, wiping, priming, repainting, and stenciling of aircraft and some aerospace ground equipment. Wastes generated include alkaline cleaning solution (450 gal/mo), PD 680 (200 gal/mo), cold tank stripper (50 gal/mo), polyurethane paint thinner (2 gal/mo), MEK (4 gal/mo), and B&B chemical 3100 (10 gal/mo). B&B chemical 3100 (Federal Specification Number 685 000 181 7597) is a petroleum solvent used as a cleaning compound. These wastes are washed down the floor drains which flow to the Industrial Waste Treatment Plant (IWTP) located in Facility 7052. The effluent from the IWTP flows into the sanitary sewer, which discharges into the City of Chicopee interceptor for treatment at the municipal treatment plant. Prior to 1970 the sanitary sewer discharged to the base sewage treatment plant located at Facility 5331. A description of the IWTP and the base sewage treatment plant appears in Section A-8, Page IV-17, "Wastewater Treatment."

c. Propulsion Shop

The propulsion shop is located in Facility 7071 and has been at this location since it went into operation in 1941. Wastes generated include synthetic turbine oil (50 gal/mo), hydraulic oil (100 gal/mo), engine oil (300 gal/mo), and slop waste consisting of PD 680, gasoline, and paint remover (50 gal/mo). The slop waste and waste oils are collected and transported to the POL waste storage area. Final disposition is sale to contractors. Prior to 1974, the final disposition of POL wastes was primarily fire department training or sale to contractors.

d. Battery Shop

The battery shop, located in Facility 7072, has been in operation since 1942. Wastes generated from the servicing and charging of aircraft batteries consists primarily of waste acid (50 gal/mo). The waste acid from lead batteries is neutralized with caustic soda and discharged into an outdoor leaching pit located outside Facility 7072. The used battery casings are sent to DPDO for salvage. The nickle cadmium batteries are not serviced and are turned in to DPDO sealed.

e. Fuel Systems

The fuel systems repair shop is presently located in Facility 7051; prior to 1980, it was located in Facility 7067. Waste fuels generated are AVGAS (<5 gal/mo) and JP 4 (<5 gal/mo). The wastes are collected in drums and trucked to the POL waste storage tank area. Since 1974 final disposition has been sale to contractors. Prior to 1974 the principal means of disposal was use in fire training or sale to contractors.

f. Pneudraulics

The pneudraulics shop is located in Facility 7072 and has been at this location since it went into operation in 1941. The primary purpose of this shop is to service and repair all aircraft pneumatic and hydraulic equipment. Wastes generated by this operation are hydraulic oil (25 gal/mo), preservative oil (5 gal/mo), and PD 680 (10 gal/mo). The PD 680 is collected, stored in a 60-gallon holding tank at the shop location, and trucked twice per year to the IWTP where it is treated. The IWTP effluent discharges into the sanitary sewer system. The hydraulic and preservative oils are collected and trucked to the POL waste storage tank area for sale to contractors. Prior to 1974 the principal means of disposal was use in fire training or sale to contractors.

g. Wheel and Tire Shop

The wheel and tire shop has been in operation since 1941 in Facility 7072. The only waste generated is PD 680 (10 gal/mo). As with the waste PD 680 from the pneudraulics shop, the waste material is collected, stored, and trucked to the IWTP twice per year.

h. Aerospace Ground Equipment (AGE)

The AGE maintenance shop is presently located in Facility 7057; prior to 1977, it was located in Facility 7071. The only waste generated is waste engine oil (40 gal/mo). Waste engine oil is collected and brought to the POL waste storage area for sale to contractors. Unserviceable batteries used in the AGE shop are sent to the battery shop for treatment and disposal.

i. Nondestructive Inspection

The nondestructive inspection (NDI) lab has been in operation since 1960 and has been located in Facility 2426 since 1972. Prior to 1972 the NDI lab was located in Nosedock 10. Nondestructive testing methods, including X-ray, magnaflux, and ultrasound, are performed in this area. Wastes generated are glacial acetic acid (1 gal/mo), kerosene (4 gal/mo), penetrant (8 gal/mo), and emulsifier (8 gal/mo). These wastes are stored together in a holding tank at the lab and intermittently trucked to IWTP where the combined waste is treated. The treated effluent discharges into the sanitary sewer system. Current practice (since 1981) is to turn the wastes in to DPDO for contractor removal.

j. Other

There are numerous other aircraft and vehicle maintenance operations which generate small amounts of wastes or which use hazardous materials that are consumed in the process. The carpentry shop (Facility 5306) uses small quantities of hydrochloric acid, and the protective coating shop (Facility 5307) uses paint and MEK with no waste generated. The electric generator shop (Facility 5312) and the vehicle maintenance shop (Facility 7073) generate small quantities of engine oil and antifreeze. The engine oil is collected and trucked to the POL waste storage tank area for sale to contractors, and the antifreeze is washed into the sanitary sewer. Prior to 1981 the antifreeze was washed into the storm sewer. The refueling maintenance shop (Facility 2425) generates small quantities of JP-4, AVGAS, engine oil, and antifreeze. The JP-4, AVGAS, and engine oil are collected and trucked to DPDO for sale to contractors, and the antifreeze is washed into the sanitary sewer.

The Air Force Special Products Production Facility was in operation at Westover AFB from 1955 to 1976. This operation was located in Facility 1900 and the industrial activities, primarily photo processing, which took place in this facility were classified. Information regarding the types and quantities of hazardous materials used at this facility was not made available. However, it was reported in the Water Pollution Survey of Westover AFB, dated June 1972, that Facility 1900 did discharge chemicals to the sanitary sewer system. From 1955 to 1970 wastes discharged into the sanitary sewer were treated at the base sewage treatment plant. From 1970 to 1976 the wastes were discharged into the City of Chicopee sanitary sewer system to be treated at the municipal treatment plant. A description of sewage treatment operations appears in Section A-8, "Wastewater Treatment." An IWTP located in Facility 1875 began construction in May 1972 for the purpose of handling the Facility 1900 waste discharge. It was reported in an interview that this IWTP was never put into operation. Therefore, with the exception of a reported silver recovery operation, the waste received no pretreatment before discharge to the sanitary sewer system.

The entomology shop controls all pesticide usage on the base. Empty containers are the only wastes generated from this department. A more detailed discussion is presented in Section A-7, Page IV-16.

2. Summary of Industrial Waste Disposal Practices

The quantities of waste oils, solvents, and paint thinners that are generated at Westover AFB are relatively small, in comparison to those at bases having significant aircraft overhaul and maintenance missions. Generally the quantity of wastes produced ranges from 10 to 6,000 gallons per year, depending upon the type of waste (see Table 2).

Information gathered in the records search and in interviews with past and present base employees indicates that there are no chemical landfills existing at Westover AFB.

The types of industrial chemicals used and the quantities of wastes generated at Westover AFB are based on recent records and information from the period during which the base has operated as an AFRES unit (1974 to present). Information regarding the types of industrial chemicals used and the quantities of wastes generated prior to 1974 was not available. The largest quantities of wastes were generated during the period in which SAC controlled the base (1955 to 1974). Based on information obtained from another SAC facility with industrial operations similar to those at Westover, typical materials used include: methanol, acetone, 1-1-1 trichloroethane, TCE, penetrants, greases and degreasers, MEK, toluene, o-dichlorobenzene, and PD 680. Some typical 1980 waste quantities at the SAC facility are as follows: TCE (30 gal/mo), MEK (30 gal/mo), toluene (30 gal/mo), and other solvents, including PD 680 (150 gal/mo). Since Westover AFB was the largest SAC facility in the eastern United States, quantities of wastes generated during the period of SAC control are estimated to have been at least as large as those mentioned above The types and quantities of wastes mentioned above have also been verified by an interviewee.

The majority of the industrial operations at Westover AFB involving hazardous chemicals and wastes have been in existence since 1941 and include general aircraft maintenance, pneudraulics repair, AGE maintenance, battery shop activities, propulsion shop activities, and wheel and tire maintenance. After SAC assumed control of the base in 1955, several more major industrial operations were activated, including aircraft corrosion control, avionics maintenance, and the NDI lab activities. After control of Westover AFB was transferred from SAC to AFRES, some industrial activities

were eliminated and waste quantities were reduced. The industrial operations generated varying quantities of waste oils, solvents, fuels, and cleaners. Most interviewees agreed that some of the above wastes could have been disposed of at the landfill sites on-base, but that this was generally an exception and not the standard means of disposal.

Standard procedures for past and present industrial waste disposal practices at Westover AFB are as follows:

- 1941 to 1974: POL wastes including small amounts of waste solvents were collected periodically from the shop locations and were then used in fire department training exercises. A 2,000-gallon tank was located at the fire training area for storage of POL wastes. POL wastes were also removed by a contractor. Cleaning compounds and those solvents not used in fire training were discharged to the storm sewers or trucked to the IWTP, after its construction in 1956, for treatment.

- 1974 to September 1981: POL wastes, consisting of fuels and oils, were collected periodically and trucked to DPDO to one of the two 4,000-gallon POL waste storage tanks at Facility 1833. Approximately 6,000 gallons of POL waste was generated between October 31, 1980 and November 1, 1981. POL wastes were sold to contractors. DPDO did not accept waste solvents until October 1981, and no removal contract existed for solvents. Solvents and cleaners were discharged to storm sewers or to the IWTP for treatment.

- October 1981 to Present: The changes in procedures during this period are as follows: DPDO now accepts waste solvents for storage until removal by contractors for proper disposal; antifreeze from the vehicle maintenance shops is discharged to the sanitary sewer; and the Westover Hazardous Waste Management Plan was put into effect November 1981.

3. Fuels

The main storage areas for JP-4 and AVGAS are Facilities 7700 and 7701. A complete inventory of fuel storage tanks, including location, capacity, and type of fuel stored, is included in Appendix F.

No problems with leaky tanks or major spills were found, nor were there any suspected fuel-saturated areas near the storage tanks. The only reported spill of any significance occurred near Facility 7921 (airfield oil/water separator) when the 8-inch fuel pipeline was ruptured by construction equipment. The spill was estimated to be several hundred gallons in volume. The incident occurred in 1970 and the majority of the spill was reportedly recovered.

As previously discussed, the majority of runoff from the taxiways, runways, and aircraft maintenance areas is discharged to Cooley Brook via one of three oil/water separators. Cooley Brook discharges into the Chicopee Reservoir approximately 0.5 mile south of Westover AFB. Due to the close proximity to the Chicopee Reservoir, any major spills which occur at Westover AFB appear rapidly in the reservoir, which is used for public recreation. For these reasons, Westover AFB has been operating under an effective spill management plan.

The major fuel storage area prior to 1979 was the fuel tank farm, which includes Facilities 7300, 7303, 7304, 7309, and 7310, with a total storage capacity of approximately 3,500,000 gallons. This land was excessed in 1979 and is no longer a part of Westover AFB. Kaman Aircraft Corporation is now the main user of the fuel tank farm.

Major fuel tanks are cleaned every 3 to 5 years. There has been no reported cleaning since 1979. Prior to 1979 the sludge from fuel tank cleaning practices (mostly water with small quantities of rust, sediment, and fuel) was allowed to weather for 4 to 6 weeks inside the berm at the fuel tank farm. Small quantities (generally less than 1,200 gallons including rinse water) of the weathered sludge were either "raked" into the ground at the tank farm or sent to base landfills for disposal. Since some of the fuel tanks contained leaded fuel, there is a potential that base landfills received some lead-bearing sludge.

4. Abandoned Tanks

The aqua system located near Facilities 2502 and 2503 has been completely abandoned. The system contains 16 25,000-gallon storage tanks. All the tanks in the underground system are in the process of being "pickled" and will contain a solution of caustic soda and water. Presently the tanks contain only water. There is also a 20,000-gallon underground tank at Facility 1601 and three 11,000-gallon tanks located underground near Facility 2500 which have been abandoned and are now empty.

5. Fire Department Training Activities

Fire department training activities have been common since activation of the base. Past and present fire department training activities at Westover AFB are as follows:

- 1941 to 1964: During this period, two old fire department training areas were reportedly used: one located in the "Christmas Tree" area near Facility 7400 and the other in the northern part of the base near Facility 887 (see Figure 7). Common practice on-base was to collect all comingled waste oils, fuels, and solvents from the industrial area in drums and then transport them to the POL waste storage area. The POL waste was then used for fire department training exercises or sold to contractors. Information regarding the frequency of the fire department training exercises was not available.

- 1964 to 1974: The fire department training area was relocated in 1964 to the location designated "Current Fire Training Area" on Figure 7 in the northwest corner of the base. This site is currently used for fire department training exercises. The same procedures were followed, POL waste being used for fire department training exercises or sold to contractors. Information regarding the frequency of fire department training exercises during this period was not available.

- 1974 to Present: POL wastes are reportedly no longer used for fire department training exercises. All POL wastes are removed by contractors. It was reported that only non-contaminated JP-4 fuel is used for fire department training. The frequency of exercises during this period is 12 times per year. Approximately 125 gallons of fuel is used per exercise.

In the fire department training exercises, the JP-4 fuel, or in the past the POL waste, is poured onto a simulated aircraft located in a bermed area and set on fire.

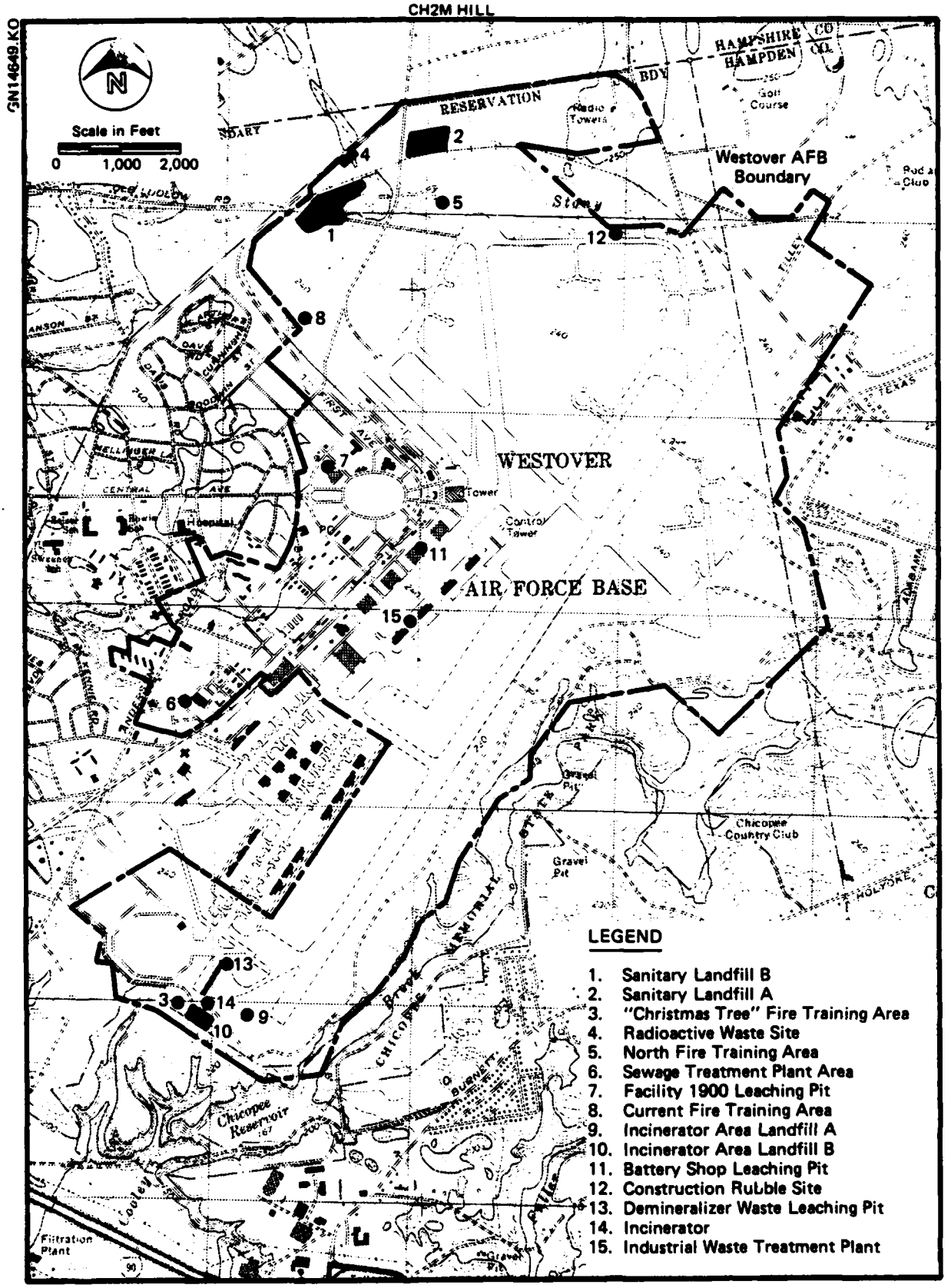

FIGURE 7. Location map of identified disposal sites at Westover AFB.

Most of the fuel is consumed in the fire. Quantities of fuel which percolate into the soil during these exercises are judged to be small.

6. Polychlorinated Biphenyls (PCBs)

Polychlorinated biphenyls (PCBs) are among the most chemically and thermally stable organic compounds known to man. Until the mid-1960's, PCBs were considered nontoxic; however, further testing demonstrated that PCBs were high-risk chronic toxicants. PCBs accumulate in animal fatty organs and tissues, especially in fish and poultry. Ingestion of contaminated animal tissues or direct contact with PCBs can cause human liver and kidney damage. Because of their stability, PCBs, once introduced into the environment, persist for long periods of time and are not readily biodegradable.

Possible sources of PCBs at Westover AFB are electrical transformers and capacitors. A program is in progress to test for PCB content transformers which have been removed from service. Out-of-service transformers have been stored at DPDO storage facilities on pallets within an earth berm. Sixteen known PCB-contaminated transformers were removed from Westover AFB by a contractor for disposal in December 1981. Twenty-five suspected PCB-contaminated transformers have been stored at Facility 1301. Based on recent tests, 20 transformers have a PCB concentration of less than 50 parts per million (ppm), three contain between 50 and 500 ppm, and one contains greater than 500 ppm. These transformers are awaiting removal by a contractor.

There is no record of any major PCB spills from leaking transformers, past disposal of PCB-containing transformers and capacitors, or disposed of oil from PCB-containing transformers to base landfills; therefore, PCB contamination was not found to be a problem at Westover AFB.

7. Pesticides

Pesticides and herbicides are commonly used at Westover AFB for weed and pest control. The entomology shop controls the use and handling of all the pesticides and herbicides used to control mosquitos, flies, roaches, rats, ants, and subterranean termites.

The major pesticides used in the past on-base are: Malathion, Diazinon, Sevin, Dursban, Chlordane, Pyrethrum, Kepone, Pentachlorophenol, calcium cyanide, Pival, Ficam W, D-Tox 4 E, Eaton's A-C Formula 50, Penta-WR, and Japonex. Proper preparation and application procedures are followed. Empty containers are triple rinsed, and punched with holes prior to disposal. The rinse water is collected and saved for dilution water. Currently the empty containers are put in the dumpster and a contractor is responsible for disposal. Prior to 1974, the empty containers were landfilled on-base. Since 1974 the use of Kepone and calcium cyanide has been discontinued. The only herbicide reported to be used is glyphosate (Round Up).

There were no reports of banned or restricted herbicides or pesticides currently used on-base. It was reported that DDT was used prior to the mid-1960's. There was no indication of inadequate disposal of residual pesticides. However, one interviewee reported that several small containers (estimated to total less than 20 pounds) of a cyanide compound were buried in the vicinity of the base sewage treatment plant. Appendix H lists the type and frequency of the more commonly used pesticides.

The quantities of waste pesticides resulting from rinsing of empty containers and application equipment from past operations are judged to be small. The records search did not indicate any apparent contamination problems from past pesticide usage.

8. Wastewater Treatment

The sewage treatment plant at Westover AFB is a primary treatment facility built in 1941 and operated until September 1970. The plant consisted of two Imhoff tanks and seven sludge drying beds. The majority of the flow consists of domestic sewage, with the contribution of industrial wastewater estimated to be less than 5 percent of the total flow. A large portion of the industrial wastewater received pretreatment after the IWTP was built in 1956.

The effluent from the base sewage treatment plant was discharged into the Chicopee River. The sludge drying beds were underlain by a leachate collection system, and the leachate was returned to the Imhoff tanks. The dewatered sludge from the sludge drying beds was buried at a nearby site designated as the Sewage Treatment Plant Area (Figure 7). It was reported that some dewatered sludge was taken to a golf course in Connecticut for disposal. The quantity of residual chemicals present in the sludge is unknown.

In 1970, the base contracted with the City of Chicopee for treatment service and then closed the base primary treatment plant. The contract calls for a maximum flow of 1,120,000 gallons daily. The base domestic and industrial wastewater is discharged into the City of Chicopee interceptor for treatment at the municipal treatment plant. Industrial wastes receive pretreatment at the industrial waste treatment plant (IWTP). The City of Chicopee Municipal Treatment Plant discharges to the Connecticut River.

The IWTP, located at Facility 7052, was built in 1956 and is currently in operation. The IWTP receives the discharge directly from Nosedock areas 32 and 34 (Facilities 7051 and 7053). Other industrial operations collect their wastes in drums and holding tanks and intermittently truck them to the IWTP. The IWTP has a design capacity

of 30,000 gallons per day (gpd). The industrial wastewater is treated by separation of grit and heavy particles by settlement, separation of oils by floating and skimming, and separation of emulsified oils by chemical treatment, flotation, and skimming. The effluent is discharged into the sanitary sewer system. The floated oils are skimmed off and stored in a 6,000-gallon underground POL waste storage tank under the building. It was reported that the 6,000-gallon storage tank has never been emptied in its 26 years of operation. Approximately 400 pounds of grit, mostly wet sand and metal wire, are removed every year and placed in a dumpster for disposal by contractor.

9. Other Activities

The review of the records and information obtained in the interviews produced no evidence of past or present storage, or handling of, biological or chemical warfare agents at Westover AFB.

Low-level radioactive electron tubes were buried at the site designated Radioactive Waste Site (refer to Figure 6) in the early 1950's in a 6-foot by 6-foot concrete vault. The concrete vault was sealed with a concrete cover and buried 6 feet deep. The ground surface at the site was tested with a radiation monitoring instrument approximately 5 years ago and no evidence of surface contamination was found. The site was originally fenced, but the fence has since been removed.

No explosive ordnance disposal activities are currently conducted at Westover AFB. There was an explosive ordanance demolition facility in operation during the period of SAC control (1955-1974).

The hospital (Facility 5700) was built in 1956 and is no longer in operation. The hospital property was excessed after SAC left Westover in 1974. The only medical facility remaining is the 439th Tactical Hospital (Facility 5600).

The Stony Brook Air Force Station was established in 1954 to provide logistical support for Westover AFB. Stony Brook was located on 746 acres of land in the northeast corner of Westover AFB. In 1957, it became an independent military facility. The installation was transformed into a nuclear weapons arsenal, and munitions storage igloos and related operational support structures were constructed. Stony Brook was deactivated in 1971, and the property was declared excess by AFRES in 1974. This area has since been developed into the Stony Brook Energy Center, the main user of the area being the Massachusetts Municipal Wholesale Electric Company (MMWEC).

10. Available Water Quality Data

The Environmental Health Service at Westover AFB is responsible for gathering all water quality data. Westover AFB obtains its potable water from the City of Chicopee. The contract with the City of Chicopee was established in 1962 and calls for a daily maximum demand of 600,000 gallons. Prior to 1962, the potable water was supplied by the Cities of Chicopee and Springfield in conjunction. The potable water supply from the City of Chicopee is treated at the base water treatment plant (Facility 606) before distribution throughout the base. Treatment consists of fluoridation and chlorination. The potable water supply is analyzed periodically for conventional water quality parameters.

There are two potable water wells at Westover AFB serving remote areas which do not receive water supplied by the City of Chicopee. One well is located on the northern

part of the base at the antenna farm (Facility 8700, refer to Figure 6). The other is located at the Granby Transmitter Site, an off-base facility located approximately 6 miles from base (refer to Figure 1). These two potable water wells are tested for bacterial contamination only. No other analyses are routinely conducted.

Numerous other wells are located on base as shown on Figure 6, but are not used as a potable water supply. There are five test wells located close to Facility 1900. These wells were drilled in the late 1960's when the possibility of using the ground water as an industrial process water supply was being explored. The ground water was found unsuitable because it was too soft for the intended industrial use. These five wells were threaded and capped within 1 year of their construction. Since no information is available on the integrity of the well casings, the potential that these abandoned wells may act as a pathway for contaminant migration to the deeper aquifer does exist. There are two abandoned wells in the northern part of the base and one operating non-potable water well located at the weather station at Facility 7905.

The storm drainage system for Westover AFB consists of a storm sewer system, culverts, and ditches. The northeast section of the base discharges stormwater into Stony Brook, the southern section discharges into Cooley Brook, and the western section discharges into Willimansett Brook. The majority of industrial operations, flightline hangars, and the runway are located in the southern section of the base. The storm drainage from these areas discharges into Cooley Brook, which flows into the Chicopee Reservoir. In 1971, three oil/water separators were constructed to pretreat the storm drainage prior to its discharge (see Figure 5). The separators have authorization to discharge to Cooley Brook under an NPDES permit.

Stormwater drainage samples are taken from the three airfield oil/water separators and are analyzed quarterly for COD, oils and grease, and settleable solids. Test results are satisfactory and are in compliance with discharge limitations as specified under the NPDES permit. An inventory of all oil/water separation pretreatment facilities appears in Appendix I.

B. Disposal Site Identification and Evaluation

1. Disposal Site Identification

Interviews with 22 past and present base personnel (Appendix C) resulted in the identification of 15 disposal sites at Westover AFB. The approximate locations of these sites are shown on Figure 7. A summary of the approximate dates that each site was in operation is given on Figure 8. The following are brief descriptions of the identified sites, in order of overall rating scores:

- Site No. 1, Sanitary Landfill B, is the largest sanitary landfill site on-base. This site was in operation from approximately 1960 until 1974. After 1974, a contract was established with a contractor for the disposal of base refuse. The landfill was initially operated as a burn and bury operation. The refuse was placed in excavated trenches, burned, and then covered with fill on a daily basis. The burning operation was discontinued around 1965 or 1966, after which the operation consisted of spreading, compacting, and covering. This site was used for the disposal of domestic refuse and general base refuse and also received ashes from the coal-fired heating plant. One interviewee reported that large quantities of tar and asphalt, estimated to be greater than 50,000 ft^3,

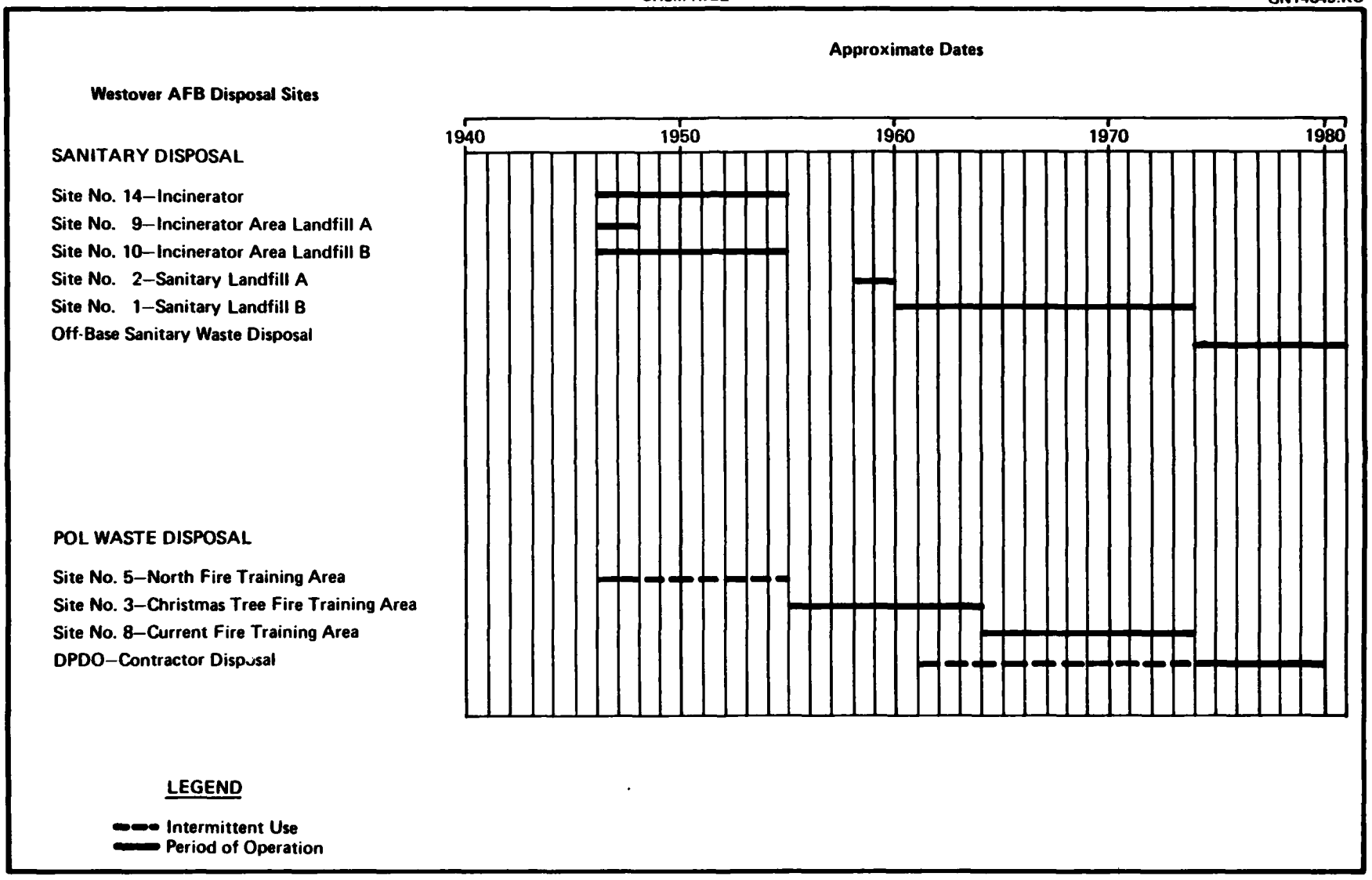

FIGURE 8. Historical summary of disposal activities at Westover AFB.

which were removed from the runway during a resurfacing operation in the early 1960's were disposed of at the site. It was also reported during the interview process that empty cans and empty 55-gallon drums from industrial operations were buried in the landfill. Prior to disposal the containers may have contained (unconfirmed) paint, paint thinners and strippers, MEK, TCE, o-dichlorobenzene, and miscellaneous aircraft cleaning compounds. There is a potential that some of the drums contained residual liquid. One interviewee reported that sludge generated from the cleaning of fuel tanks was weathered at the tank farm, then sometimes landfilled on-base. Since some of the fuel tanks contained leaded fuel, there is a potential that this site received some lead-bearing sludge during its 14-year operation. Fuel filters which are changed intermittently during maintenance were also landfilled. The potential that this site received filters from leaded fuel tanks exists. Although Sanitary Landfill B has been designated as a closed sanitary landfill since 1974, there is evidence of recent activity in 1981. Some areas of the landfill show evidence of recent unauthorized dumping with inadequate cover in some areas. Standing water in an area adjacent to the south boundary of the landfill contained an orange/brown sediment and some floating oils. As discussed earlier in Section III-D-5, Page III-13, the orange/brown sediment is typical of iron or iron bacteria deposits. Since Site No. 1 is known to contain medium quantities of hazardous wastes, it was rated using the Air Force site rating methodology.

- Site No. 2, Sanitary Landfill A, was operated from approximately 1958 until 1960, as a burn and bury operation. This site received primarily domestic

refuse, general base refuse, and ashes from the coal-fired heating plant. Interviewees reported that Sanitary Landfill A received empty containers and drums. The short period this site was in use was partially due to the depth of the ground-water table in the close vicinity of the landfill, which was reported to be 5 to 10 feet below the surface. The trenches excavated for refuse disposal were often excavated below the level of the ground-water table. Therefore, the refuse was sometimes dumped into standing water. Of the 15 sites, Sanitary Landfill A is the closest to surface water; the landfill is within 400 feet from Stony Brook. Since Site No. 2 is suspected of containing small quantities of hazardous wastes, it was rated using the Air Force site rating methodology.

Fire department training activities have been common practice since activation of the base. As discussed previously in Section A-5, Page IV-12, "Fire Department Training Activities," three fire training areas were determined from the records search. During the period from 1941 until 1964, two old fire training areas were used. The oldest of the two is located near Facility 887 and is referred to as the North Fire Training Area. The other site, "Christmas Tree" Fire Training Area, is located near Facility 7400 (refer to Figure 6). Information regarding the frequency of the fire training exercises during this period was not available. Since 1964 the fire training exercises have been conducted at the Current Fire Training Area (refer to Figure 6). Common practice until 1974 was to collect all POL wastes from the industrial operations and transport them to the POL waste storage area. The POL waste was then used for fire training exercises or sold to contractors. The POL waste was poured onto a simulated aircraft located in a bermed area and set on fire. Most of the POL waste was

consumed in the fire. The quantities of POL waste which may have percolated into the ground are judged to be small. Since 1974, JP-4 fuel has been used for fire training exercises.

- Site No. 3, "Christmas Tree" Fire Department Training Area, was the site used for fire training exercises from activation of the base through 1964. POL wastes and waste solvents were used for fire training exercises. Information regarding the frequency of the exercises was not available. Since known small quantities of hazardous wastes were used at this site, it was rated using the Air Force site rating methodology.

- Site No. 4, Radioactive Waste Site, was used as a disposal site for low-level radioactive electron tubes, which were reported to have been disposed of only once, around 1952 or 1953. Interviewees reported that the electron tubes were placed in a 6-foot by 6-foot concrete vault which was then buried 6 feet underground. A radiological survey conducted at the site showed no measurable radiation at the surface. A fence built around the site to show its exact location has since been removed. Since this site contains small quantities of hazardous wastes, it was rated using the Air Force site rating methodology.

- Site No. 5, North Fire Department Training Area, was the site reported by one interviewee to be used intermittently for fire training exercises prior to 1964. POL wastes and waste solvents were used for fire training exercises. Information regarding the frequency of the exercises was not available. Since suspected small quantities of

hazardous wastes were used at this site, it was rated using the Air Force site rating methodology

- Site No. 6, Sewage Treatment Plant Area, is located at the old sewage treatment plant, Facility 5331. The sewage treatment plant was in operation from 1941 until 1970 and consisted of two Imhoff tanks and seven sludge drying beds. The sludge drying beds had a leachate collection system and the leachate was returned to the Imhoff tanks. The dewatered sludge from the drying beds was buried intermittently in the Sewage Treatment Plant Area throughout its period of operation. It was reported that some of the dewatered sludge was trucked to a golf course in Connecticut for disposal. The sewage treatment plant treated primarily domestic sewage, with the contribution of industrial wastewater estimated to be less than 5 percent of the total flow. It should be pointed out that the Air Force Special Products Production Facility (Facility 1900) discharged industrial wastewater without pretreatment to the plant from 1955 to 1970. The volume and characteristics of this industrial wastewater are unknown. The sludge was not tested for toxicity, and the quantity of residual chemicals present in the sludge is unknown. An interviewee reported that several small containers (estimated to be less than 20 pounds) of a cyanide compound were buried at the sewage treatment plant in the late 1940's. The cyanide was reportedly used as a pesticide in a fumigation operation. One of the Imhoff tanks at the plant has been turned into a disposal area for asbestos. Before any old barracks or buildings were demolished, after the departure of SAC from Westover AFB, any asbestos material present in the building was

removed for separate disposal. The asbestos material was placed in plastic bags, put into the old Imhoff tank, and then covered with dirt fill. Approximately 30 cubic yards of asbestos is stored at the site. Since this site is known to contain small quantities of hazardous waste, it was rated using the Air Force site rating methodology.

- Site No. 7, Facility 1900 Leaching Pit, is located adjacent to Facility 1900. The Air Force Special Products Production Facility was located at Facility 1900 and operated from 1955 to 1976. An interviewee reported that a leach field existed at this site for the disposal of waste acids. Since information regarding the industrial activities which took place in this facility was classified, the quantities of waste acids leached into the ground are unknown. The specific industrial activity which generated the waste acids, whether the waste acids were contaminated with any metals, and whether the waste acids were neutralized before discharge, are also unknown. Since this site is suspected of containing small quantities of hazardous waste, it was rated using the Air Force site rating methodology.

- Site No. 8, Current Fire Department Training Area, has been the site used for fire training exercises since 1964. From 1964 to 1974, POL wastes and waste solvents were used for fire training exercises. Since 1974, POL wastes have not been used at the fire training area. Instead, non-contaminated JP-4 is used for the exercises. The frequency of training exercises since 1974 has been 12 times per year. Approximately 125 gallons of fuel is used per exercise. Since known small quantities

of hazardous wastes are used at this site, it was rated using the Air Force site rating methodology.

- Site No. 9, Incinerator Area Landfill A, was in operation from 1946 until 1948 and was reported to be the first landfill on-base. Incinerator Area Landfill A was operated as a burn and bury operation. During the period from 1941 to approximately 1958, the primary means of municipal refuse disposal was incineration. This site reportedly received mostly incinerator ash and residue and ash from the coal-fired heating plant. Since no known or suspected industrial or hazardous wastes were disposed of at this site, this site was not rated.

- Site No. 10, Incinerator Area Landfill B, was in operation from approximately 1946 until 1955 as a burn and bury operation, receiving mostly incinerator ash and residue and ash from the coal-fired heating plant. This site was reported to have been used as a temporary storage area for POL wastes before they were transported to the fire training area. Since no known or suspected industrial or hazardous wastes were disposed of at this site, this site was not rated.

- Site No. 11, The Battery Shop Leaching Pit, is located outside Facility 7072 and has been in operation since 1942. Waste acids are generated from the servicing and charging of aircraft batteries. Approximately 50 gal/mo of waste acids are neutralized with caustic soda and discharged into an outdoor leaching pit. There is a potential that the waste acids from lead batteries are contaminated with metals, such as lead. Since

this site is known to contain small quantities of hazardous wastes, it was rated using the Air Force site rating methodology.

- Site No. 12, The Construction Rubble Site, is located in the northeast corner of the base along the base property line. This site was used in the early 1970's for the disposal of wood, concrete, and miscellaneous other construction materials from old barracks and other buildings which were demolished. A ground tour of this site showed no evidence that anything other than construction debris was buried at this site. Since no known or suspected industrial or hazardous wastes were disposed of at this site, it was not rated.

- Site No. 13, The Demineralizer Waste Leaching Pit, is located outside Facility 7400. The Demineralizer Plant was operated from 1952 to 1974. The waste brine solution generated at this facility consisted of minerals (calcium, magnesium, etc.) that were removed from the base water supply. The waste brine solution was discharged to an outdoor leaching pit. Since no known or suspected industrial or hazardous wastes were disposed of at this site, it was not rated.

- Site No. 14, The Incinerator Site, is the former site of the base incinerator located in the southwest corner of the base. Incineration was the main method of disposal of base refuse from approximately 1941 to 1958. After 1958, the incinerator was used intermittently for the destruction of shredded classified information. The incinerator was demolished in 1981. Ash and residue from the incinerator was landfilled on-base. Since no

known or suspected industrial or hazardous wastes were disposed of at this site, it was not rated.

- Site No. 15, Industrial Waste Treatment Plant, was built in 1955 and is currently in operation. The IWTP is located in Facility 7052 and receives the discharge directly from Nosedock areas 32 and 34 (Facilities 7051 and 7053). Other industrial operations collect their wastes in drums and holding tanks and intermittently truck them to the IWTP. The operation of the IWTP has been discussed in further detail in Section A-8, Page IV-18. The effluent from the IWTP, which has a design capacity of 30,000 gpd, is discharged into the sanitary sewer system. The floated oils are skimmed off and stored in a 6,000-gallon underground POL waste storage tank located under the building. Since the 6,000-gallon tank has never been emptied in its 26 years of operation, the potential that waste oils may have leaked from the storage tank exists. Since Site No. 15 is suspected of containing small quantities of hazardous wastes, it was rated using the Air Force site rating methodology.

2. Disposal Site Evaluation

Based on the information obtained from the interviews, the base records, and ground tours of the base, 10 identified disposal sites were evaluated. The major characteristics of each disposal site are summarized in Table 3. The sites were rated using the U.S. Air Force Hazard Assessment Rating Methodology (HARM) which was developed jointly by the Air Force, CH2M HILL, and Engineering-Science for specific application to the Air Force Installation Restoration Program.

Table 3
SUMMARY OF DISPOSAL SITE CHARACTERISTICS

Site No.	Site Description	Distance to Nearest Well (ft)	Distance to Nearest Water Body (ft)	Nearest Surface-Water Body	Depth to Ground Water (ft)	Critical Environments	Evidence/Quantity of Hazardous Wastes	Waste/Hazardous Waste Type
1	Sanitary Landfill B	1,000	2,000	Stony Brook Class B	10-15	Wetlands	Known/Medium	General refuse
2	Sanitary Landfill A	800	<400	Stony Brook Class B	5-10	Wetlands	Suspected/Small	General refuse
3	"Christmas Tree" Fire Training Area	7,000	1,200	Cooley Brook Class B	10-15	Natural Area	Known/Small	POL waste
4	Radioactive Waste Site	1,200	2,000	Stony Brook Class B	10-15	Wetlands	Known/Small	Low-level radioactive electron tubes
5	North Fire Training Area	200	1,600	Stony Brook Class B	10-15	None	Suspected/Small	POL waste
6	Sewage Treatment Plant Area	4,200	600	Willimansett Brook Class B	10-15	None	Known/Small	Sludge, cyanide, asbestos
7	Facility 1900 Leaching Pit	100	4,000	Willimansett Brook Class B	10-15	None	Suspected/Small	Waste acids
8	Current Fire Training Area	2,200	4,000	Stony Brook Class B	10-15	None	Known/Small	POL waste
9	Incinerator Area Landfill A	7,000	1,600	Cooley Brook Class B	10-15	Natural Area	None	General refuse and incinerator ash
10	Incinerator Area Landfill B	7,000	2,200	Cooley Brook Class B	10-15	Natural Area	None	General refuse and incinerator ash
11	Battery Shop Leaching Pit	1,800	4,000	Cooley Brook Class B	10-15	None	Known/Small	Waste acids
12	Construction Rubble Site	2,100	<400	Stony Brook Class B	10-15	None	None	Construction rubble
13	Dimineralizer Waste Leaching Pit	6,000	1,800	Cooley Brook Class B	10-15	Natural Area	None	Waste brine
14	Incinerator	7,000	--	Cooley Brook Class B	10-15	Natural Area	None	Municipal refuse
15	Industrial Waste Treatment Plant	2,400	3,200	Cooley Brook Class B	10-15	None	Suspected/Small	POL Waste

The Air Force site evaluation system consists of 26 rating factors that are divided into four categories, i.e., receptors, pathways, waste characteristics, and waste management practices, which are used to evaluate the principal targets of contamination, the mechanisms for migration, the hazards posed by the contaminants, and the facility's design and operation, respectively. A more detailed description of this Hazard Assessment Rating Methodology is included in Appendix J.

The following is a brief discussion of the results of the site assessments and a description of general site characteristics in each of the four rating categories.

a. Receptors

This category assesses the human population and critical environments which may potentially be affected by hazardous materials released from a waste disposal site.

The population living or working within 1,000 feet of the identified sites is very small, never exceeding 25 people. However, all 10 sites are within 1 mile of a residential area. Also, all the sites except Sites No. 5, No. 11, and No. 15 are within 1,000 feet of the reservation boundary. Sites No. 7, No. 5, and No. 2 are approximately 100, 200, and 800 feet, respectively, from the closest well. The critical environment within 1 mile of Sites No. 1, No. 2, No. 4, and No. 5 is a minor wetland area. Site No. 3 is located within 1 mile from another critical environment, the Chicopee Memorial State Park, which is a preserved area. The water quality designation of all nearby surface-water bodies is Class B. Class B is defined as inland waters suitable for bathing and other contact recreation, suitable for agricultural and certain industrial process cooling uses; suitable as an excellent fish and wildlife habitat; and excellent aesthetic value.

The ground water in the uppermost aquifer (sand and gravel aquifer) is used by many individuals in the vicinity of Westover AFB as a potable water supply; however, municipal water is available. In summary, the close proximity of the sites to the reservation boundary and to the residential areas and the use of the uppermost aquifer as a potable water source are the main rating factors contributing to the receptors subscores.

b. Pathways

This category assesses the potential routes and mechanisms by which hazardous materials can escape from a waste disposal site.

The potential for migration can be considered along three potential pathways: surface-water migration, flooding, and ground-water migration. For all sites, the potential for ground-water contamination was found to be highest of the three pathways. The depth to ground water is approximately 10 to 15 feet for all sites with the exception of Site No. 2, where the depth to ground water is 5 to 10 feet. The soil is relatively permeable (10^{-2} cm/sec), and the net precipitation is high. The potential for flooding is minimal since Westover AFB is located beyond the 100-year flood plain. The potential for migration to surface waters is also generally high, because the distance from most sites to a nearby surface water is short. Site No. 2 is less than 400 feet from Stony Brook and Site No. 6 is approximately 600 feet from Willimansett Brook. In summary, the short distance to the ground water, high net precipitation, and the relatively permeable soil were the main rating factors contributing to the pathways subscores.

c. Waste Characteristics

This category assesses the potential hazards posed by the waste materials present in a disposal site. The waste characteristics that are evaluated include the probable type and relative quantities of waste materials present as well as the degree of certainty as to their existence, whether known, suspected, or unknown. The potential for contaminant migration is low if no known quantities or only small quantities of hazardous materials are present, even if the site has receptors and pathways favorable to migration.

Site No. 1 is known to contain medium quantities of hazardous wastes and was assigned the highest waste characteristic subscore. Sites No. 3, No. 4, No. 6, No. 8, and No. 11 are known to contain small quantities of hazardous wastes. The remaining sites rated are suspected of containing small quantities of hazardous wastes. Sites No. 1, No. 2, No. 4, and No. 6 contain highly persistent wastes and were assigned a persistence factor of 1.0. Sites No. 3, No. 5, No. 8, and No. 15 were assigned a persistence factor of 0.8 because these sites contain fuel and waste oils. Sites No. 7 and No. 11 received a persistence factor of 0.4 because these sites have received waste acids. With the exception of Sites No. 4 and No. 6, all sites received liquid materials and were assigned a physical state multiplier of 1.0. Sites No. 4 and No. 6 received solid materials and were assigned a physical state multiplier of 0.50.

d. Waste Management Practices

This category assesses the design characteristics and management practices at a disposal site as they relate to the site's environmental impact. It also examines the measures that have been taken to minimize exposures to hazardous wastes.

None of the sites were designated a hazardous waste landfill. The sites do not have liners, leachate, or gas collection systems, impervious covers, or accurate records. The impact of these management practices is minimized, however, by the relatively small quantities of hazardous wastes and total wastes disposed of at these sites. Copies of the rating forms completed for each site are included in Appendix K. A summary of the results of the site assessments, using the Air Force Hazardous Assessment Rating Methodology is given in Table 4.

Table 4
SUMMARY OF RESULTS OF SITE ASSESSMENTS

Site No.	Site Description	Subscores (% of Maximum Possible Score in Each Category)				
		Receptors	Pathways	Waste Characteristics	Waste Management Practices Factor	Overall Score[a]
1	Sanitary Landfill B	56	53	80	1.0	68
2	Sanitary Landfill A	66	76	40	1.0	61
3	"Christmas Tree" Fire Training Area	54	67	48	1.0	56
4	Radioactive Waste Site	66	58	15	0.95	44
5	North Fire Training Area	63	67	32	1.0	54
6	Sewage Treatment Plant Area	52	49	30	1.0	44
7	Facility 1900 Leaching Pit	57	49	16	1.0	41
8	Current Fire Training Area	55	67	48	1.0	57
11	Battery Shop Leaching Pit	54	49	24	1.0	42
15	Industrial Waste Treatment Plant	54	49	32	1.0	45

[a]Overall Score is the average of the three subscores for receptors, pathways, and waste characteristics multiplied by the waste management practices factor.

V. OFF-BASE INSTALLATION

V. OFF-BASE INSTALLATION

Westover AFB presently supports the operation of only one off-base installation. The installation is known as the Granby Transmitter Site and is located approximately 6 miles from the the base in Granby, Massachusetts.

Detachment 5, 1st Aerospace Communications Group, is responsible for the Granby Transmitter Site. The group's mission is to maintain radio communications equipment supporting the SAC command and control system through a Giant Talk station. The group is also responsible for the operation of the antenna farm receiver site located on-base.

The Granby Transmitter Site is located on about 99 acres of land. Three operations buildings in a fenced-in area and six antennas are located at the site. Routine maintenance of the antennas involves changing the heavy-weight oil twice per year. Approximately 2 to 3 quarts of waste oil per antenna is generated. The waste oil, which does not contain PCBs, is collected in a 55-gallon drum and periodically transported to the POL waste storage area at Westover AFB. No hazardous wastes are disposed of at the facility. There are also no reported landfills or burial sites on the property.

VI. CONCLUSIONS

VI. CONCLUSIONS

A. No direct evidence was found to indicate the migration of hazardous contaminants beyond the Westover AFB property lines.

B. Information obtained through interviews with past and present base personnel, base records, and field observations indicates that small quantities of hazardous wastes have been disposed of in base landfills in the past.

C. Industrial activity at Westover AFB consists primarily of routine aircraft and vehicle maintenance. Quantities of hazardous wastes generated are small. However, larger quantities may have been generated during the period of SAC control (1955-1974).

D. A potential exists for migration of pollutants due to (1) high ground-water table, (2) permeable soil conditions, (3) the absence of continuous impermeable confining strata in the unsaturated zone above the water table, and (4) high net precipitation.

E. Table 5 presents a priority listing of the rated sites and their overall scores. Although no imminent hazardous sites were identified, the following site was designated as the area showing the most significant potential (relative to other sites) for environmental impact.

1. <u>Site No. 1 (Sanitary Landfill B)</u>

Site No. 1 was used for the disposal of domestic refuse and general refuse such as empty containers and empty 55-gallon drums from industrial operations during the period from 1960 until 1974. Prior to disposal, some of the containers and drums may

Table 5
PRIORITY LISTING OF DISPOSAL SITES

Site No.	Site Description	Overall Score
1	Sanitary Landfill B	68
2	Sanitary Landfill A	61
8	Current Fire Training Area	57
3	"Christmas Tree" Fire Training Area	56
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have contained (unconfirmed) paint, paint thinners and strippers, TCE, o-dichlorobenzene, and MEK. There is a potential that some of the drums contained residual liquids. One interviewee reported that sludge generated from the cleaning of fuel tanks was sometimes landfilled on-base. Since some of the fuel tanks contained leaded fuel, there is a potential that this site received some lead-bearing sludge during its 14-year operation. Fuel filters which are changed intermittently during maintenance were also landfilled. The potential that this site received filters from leaded fuel tanks exists. Site No. 1 is known to contain medium quantities of hazardous wastes and received a higher overall score (relative to other sites) primarily due to:

- Permeable soil conditions
- High net precipitation
- Depth to ground water (10 to 15 feet)
- Indirect evidence of leachate migration in an area adjacent to the site's southern boundary
- Proximity to reservation boundary
- Known medium quantities of hazardous wastes

F. The remaining sites are not considered to pose a significant hazard for migration of contaminants. Therefore, these sites do not warrant additional study.

VII. RECOMMENDATIONS

VII. RECOMMENDATIONS

To verify that hazardous contaminant migration is not a problem at Site No. 1, a limited Phase II program is advisable. The recommended program includes the following:

A. Site No. 1 was identified as the area showing the most significant potential (relative to other sites) for environmental impact. Due to the close proximity to the reservation boundary, a limited monitoring program in this area will provide good evidence of whether hazardous contaminants are migrating off the installation or not. The suggested program includes:

   1. Installation of a total of four monitoring wells, three downgradient and one upgradient from Site No. 1. The ground-water movement is to the north and northeast, but its exact direction is ill-defined. The monitoring wells should be located along the reservation boundary to the north and northeast of Site No. 1 (refer to Figure 7).

   2. Construction of the wells to a depth of approximately 20 feet.

   3. Sampling of the potable water well located at the antenna farm and the abandoned well located at the old kennel farm (Facility 8871) (see Figure 6), which are approximately 4,200 feet and 1,100 feet from Site No. 1, respectively.

B. The above wells should be sampled at least once and analyzed for the following:

Parameter	Reason
pH, COD, TOC, oil and grease	Indicators of nonspecific gross contamination
Phenol, volatile organic compounds including TCE, o-dichlorobenzene, and MEK	Indicators of specific hazardous wastes generated at Westover AFB
Lead	Possible contaminant from fuel tank sludges
Iron	Indicator of landfill leachate

C. A pressure test of the 6,000-gallon underground POL waste storage tank located at the Industrial Waste Treatment Plant (Facility 7052) should be conducted to determine if the tank is leaking.

D. Details of the program outlined above, including the exact location of monitoring wells, should be defined as part of the Phase II Program. Since no imminent hazard has been determined, there is no immediate urgency to conduct the above program, which can be implemented as financial resources become available.

It is not the intent of the Phase I Program to assess the depth or location of any contaminated plume or the direction or rate of movement of such a plume. In the event that contaminants are detected in the water samples collected from any of the wells, a more extensive field survey program should be designed to determine the extent of the contaminant migration. The Phase II contractor should be responsible for evaluating the results of the program outlined above and for recommending additional monitoring required.

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AD-A114 904 CH2M HILL GAINESVILLE FL F/G 13/2
INSTALLATION RESTORATION PROGRAM RECORDS SEARCH.(U)
APR 82 F08637-80-G-0010
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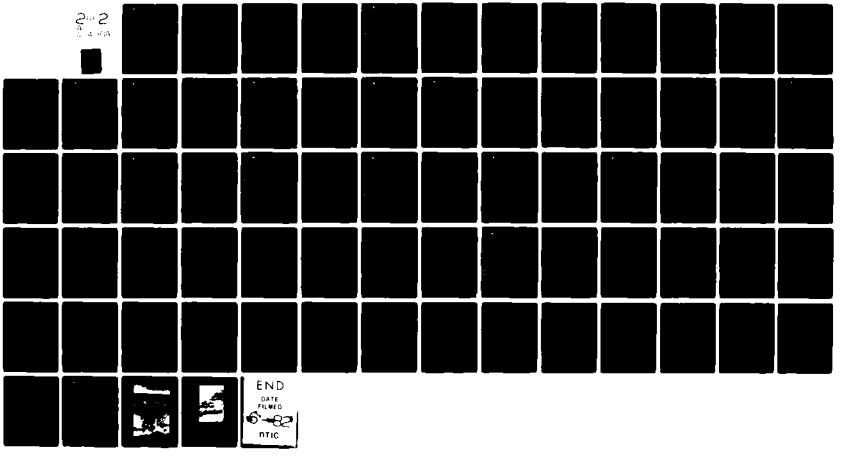

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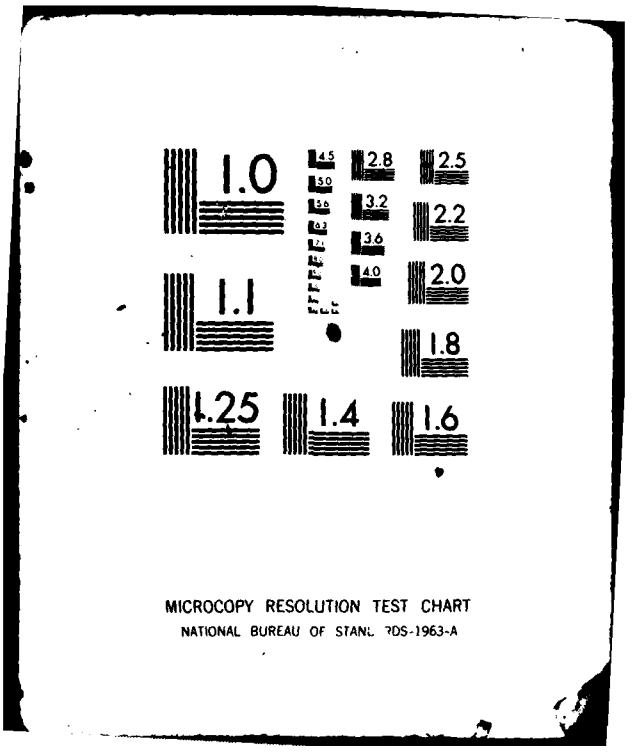
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5.0
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6.3
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

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Appendix A
RESUMES OF TEAM MEMBERS

JAMES L. HAWLEY
Manager, Water Supply and Treatment

Education

Value Engineering Course, University of Wisconsin, 1977
M.S., Sanitary Engineering, Iowa State University, 1964
B.S., Civil Engineering, Iowa State University, 1962

Experience

Mr. Hawley is currently involved in a wide range of water and wastewater projects, as follows:

- Evaluation of operation, maintenance, and rehabilitation of existing wastewater treatment plants on the Mississippi Gulf Coast, for the Gulf Coast Wastewater Authority.
- Design of a water treatment plant sludge dewatering system for the Ft. Pierce Utilities Authority, Ft. Pierce, Florida.
- WWTP evaluations for the City of Gainesville, Florida's, Kanapaha Plant and the Ft. Pierce Utilities Authority.
- Value Engineering team member--Jefferson Parish, Louisiana, Wastewater Treatment Plant.
- Project Manager for design of Ft. Pierce, Florida, Wastewater Treatment Plant.

Prior to joining CH2M HILL, Mr. Hawley was director of the Environmental Engineering Department with Clark, Dietz, and Associates Engineers, Inc. He was responsible for the planning, design, and construction of projects dealing with industrial and municipal waste treatment, solid waste disposal, potable water supply, flood control, drainage, hydrology, and environmental assessment.

Specific projects in the Midwest on which Mr. Hawley had major responsibilities include:

- Combined sewer overflow studies for the Cities of Galesburg and Joliet, Illinois.
- Final design of advanced wastewater treatment plants employing activated sludge, high purity oxygen, nitrification, filtration, and phosphorus removal, including a 125-million-gallon-per-day plant for the City of Indianapolis, Indiana.
- Value Engineering Analyses at a major industrial waste facility for the Holston Army Ammunition Plant in Tennessee, and advanced waste treatment plants for the Cities of Champagne-Urbana, Illinois, and Richmond, Indiana.

JAMES L. HAWLEY

- Design of combined sewer overflow containment and treatment system for the City of Peoria, Illinois.

- Conceptual and final design of the Illinois Environmental Resources Training Center at Edwardsville, Illinois. The Center provides training to waste and wastewater treatment plant operators in Illinois.

Mr. Hawley's experience before joining Clark, Dietz included designing and supervising construction of water distribution and wastewater systems.

Professional Engineer Registrations

Illinois, Indiana, Iowa, North Carolina, Ohio

Membership in Organizations

American Water Works Association
Water Pollution Control Federation
American Society of Civil Engineers
Society of American Military Engineers

GREGORY T. MCINTYRE
Environmental Engineer

Education

M.S., Environmental and Water Resources Engineering, Vanderbilt University, 1981
B.S., Environmental Engineering, University of Florida, 1980

Experience

Mr. McIntyre's responsibilities at CH2M HILL involve projects dealing with laboratory and pilot treatability studies, industrial waste treatment processes, and hazardous wastes. Since joining the firm in September 1981, his project-related assignments have included:

- Participation in wastewater characterization, laboratory pilot plant treatability study, evaluation of existing pretreatment, and conceptual design for equalization and aerobic biological treatment of industrial wastewater for Hercules, Inc.

- Hazardous materials disposal site records search for the U.S. Air Force to assess the potential for hazardous contaminant migration from past disposal practices and to recommend follow-up actions.

While in graduate school working as a research assistant, some of Mr. McIntyre's activities included:

- Researching the removal of heavy metals, including copper, zinc and trivalent chromium, using a large-scale adsorbing colloid foam flotation pilot plant.

- Experimental verification of the mathematical model of a continuous flow flotation column.

Professional Registration

E.I.T., Florida

Membership in Organizations

American Water Works Association
Water Pollution Control Federation
Tau Beta Pi

Publications

"Inexpensive Heavy Metal Removal By Foam Flotation." (Coauthors E. L. Thackston, J. J. Rodriguez, and D. J. Wilson). *Proceedings of the 35th Annual Purdue Industrial Waste Conference*, May 1981. *Proceedings of the International Conference on Heavy Metals in the Environment*, Amsterdam, September 1981. *Proceedings of the 2nd Mediterranean Congress of Chemical Engineering*, Barcelona, Spain, October 1981.

GREGORY T. MCINTYRE

"Copper Removal by an Adsorbing Colloid Foam Flotation Pilot Plant." (Coauthors E. L. Thackston, J. J. Rodriguez, and D. J. Wilson). *Separation Science and Technology*. (In Press)

"Experimental Verification of the Mathematical Model of a Continuous Flow Flotation Column." (Coauthors J. E. Kiefer, J. J. Rodriguez, and D. J. Wilson). *Separation Science and Technology*. (In Press)

"Pilot Plant Study of Copper, Zinc, and Trivalent Chromium Removal by Adsorbing Colloid Foam Flotation." M.S. Thesis, Vanderbilt University, 1981.

STEPHEN J. HAHN
Division Manager, Civil Engineering

Education

M.S., Civil Engineering, University of Illinois, 1974
B.S., Civil Engineering, University of Illinois, 1973

Experience

Mr. Hahn serves as project manager for the design of dams, marinas, and port facilities. He is also responsible for geotechnical investigations and analyses for foundations, embankments, excavations, retaining structures, ponds, pipelines, and roads. His project-related responsibilities have included:

Geotechnical Engineering:

- Investigations and foundation recommendations for wastewater treatment plants in Harriman, Tennessee; Charlotte, North Carolina; Waycross, Georgia; Port Angeles, Washington; and St. Petersburg, Florida.
- Investigations and foundation recommendations for water treatment plants in Naples, Florida; Alexander City, Alabama; Trinidad, West Indies; and Colorado Springs, Colorado.
- Investigations and foundation recommendations for numerous swimming pools, water reservoirs, ponds, school and office buildings, industrial plant facilities, pipelines, pump stations, transmission towers, and sea walls.
- Geotechnical site feasibility studies for a 20-MW diesel engine power plant near Sebring, Florida.
- Construction monitoring and dewatering systems evaluation for deep excavations in St. Petersburg, Florida; Miami, Florida; and Greece, New York.

Dams:

- Project management for the design and construction of post-tensioned steel anchors and concrete repairs for a 30-foot-high concrete gravity dam in Habersham, Georgia.
- Geotechnical investigations and preliminary designs for three earthfill dams in Williamsburg, Virginia.
- Hydrologic investigations and slope stability analyses for design of a 120-foot-high embankment dam for the ARCO shale oil project near Rifle, Colorado.

- Independent review of construction plans for the W.R. Grace waste clay storage dams in Manatee County, Florida.
- Independent review of construction plans for Lake Newport Dam, Reston, Virginia.
- Preparation of operations, maintenance and inspection plans for Lake Anne Dam, Reston, Virginia.

Membrane-Lined Ponds:

- Project management for the design of PVC-lined industrial ponds in Dallesport, Washington, and Colorado Springs, Colorado.
- Resident inspection for construction of a 10-million-gallon, Hypalon-lined in Eugene, Oregon.
- Investigation of the failure of a Hypalon-lined polishing pond in Live Oak, Florida.

Ports and Marinas:

- Project management for the design of a new 25-slip boat marina for Northampton County, Virginia. Project included a precast concrete floating dock moorage system, comfort station and harbor-master's office, a four-lane launching ramp with two courtesy docks, parking lot, boat pump-out facilities, sanitary waste disposal system, and potable water supply system.
- Project management for the design of a new precast concrete sea wall at the City Yacht Basin in Ft. Pierce, Florida.
- Design of steel pipe piles and prestressed concrete piles, including lateral pile load tests for the Municipal Yacht Pier in St. Augustine, Florida.
- Geotechnical investigations for landfills and piles for a containerized-cargo unloading facility for the Port of Seattle, Washington.

While a graduate student, Mr. Hahn investigated innovative support systems for rapid transit tunneling. He devoted considerable research to the material properties of pneumatically applied concrete.

Professional Engineer Registrations

Florida, Georgia, Maryland, North Carolina, Virginia

BRIAN H. WINCHESTER
Ecologist

Education

B.S., Wildlife Ecology, University of Florida, 1973

Experience

Mr. Winchester's primary responsibility is project management. He has broad experience in study design and implementation of field sampling programs, data interpretation, impact assessment and prediction, impact mitigation and remedial method development, report preparation and review, and expert consultation at client/agency hearings. He has successfully prepared numerous Environmental Impact Statements (EIS's), Developments of Regional Impact (DRI's), and environmental assessments for a variety of industries, utilities, and public agencies.

- EIS Studies—Designed and directed terrestrial and wetland biology studies for alternative Trident Submarine Base sites in Florida, Georgia, South Carolina, Virginia, and Rhode Island. Conducted biota inventories and assessed impacts of maintenance dredging along the 300-mile Gulf Intracoastal Waterway, Louisiana. Mapped biotic communities and assessed impacts of watercourse channelization on the 9-square-mile California Lake Watershed, Florida.

- DRI Studies—Managed or assisted in preparing five phosphate mine DRI's in central Florida. Helped develop mining and reclamation plans and provided technical input at client/agency hearings. Also provided biological baseline and impact assessment data for beneficiation plant sitings. Conducted biotic community inventories, delineated wetlands, and prepared DRI's for three proposed residential developments in central and southern Florida.

- Wetlands Studies—Assessed capacity of a 450-acre swamp in northeastern Florida to assimilate secondarily treated sewage. Investigated feasibility of enhancing wet prairie wetlands in southern Mississippi with municipal wastewater. Assessed impacts of water-table drawdown on Florida wetland vegetation in Palm Beach and Pasco Counties. Developed cost-effective, time-effective methodology for estimating the ecological value of freshwater wetlands and applied the technique to over 800 wetlands in central peninsular Florida; prepared wetland maps for Pasco, Pinellas, Hillsborough, Manatee, and Collier Counties; and assessed potential dredge and fill impacts on numerous wetlands.

- Industry Studies—Managed two 2-year biological monitoring studies assessing potential impacts of industrial effluents in upper Escambia Bay, Florida. Conducted baseline terrestrial and estuarine aquatic quarterly sampling for a proposed clean fuels facility in Jacksonville, Florida. Predicted SO_2 and NO_x air emission impacts on vegetation for a proposed caprolactam facility in southern Alabama.

BRIAN H. WINCHESTER

- Hazardous Waste Studies—Assessed ecological impacts associated with hazardous substances and their disposal at 13 USAF installations located throughout the U.S.

- Power Plant Studies—Studied aquatic biota entrained at a Miami generating station. Assessed impacts of blowdown on plant communities surrounding two Florida generating stations. Assessed alternative transmission line ROW's in Alachua County. Assisted in delineation of biotic communities for a generating station expansion in Crystal River, Florida. Prepared environmental assessments for siting power plants in western and northeastern Washington.

- Transportation/Corridor Studies—Evaluated biological impacts associated with alternative routings of major new highways in Pinellas and Duval Counties, Florida. Assessed environmental impacts of upgrading a telephone communications corridor extending from Windermere to Tampa. Prepared an ecological assessment for a proposed interstate highway interchange in Flagler County.

- Rare and Endangered Biota Research—Managed research on the ecology and management of a recently rediscovered endangered mammal. Conducted numerous endangered biota inventories.

Membership in Organizations

Ecological Society of America
City of Gainesville Hazardous and Nuclear Waste Committee

Publications

"Assessing Ecological Value of Central Florida Wetlands: A Case Study." *Proceedings of the Eighth Annual Conference on the Restoration and Creation of Wetlands* (in press). 1981.

"Valuation of Coastal Plain Wetlands in the Southeastern United States." *Symposium on Progress in Wetlands Utilization and Management* (in press). 1981.

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Appendix B
OUTSIDE AGENCY CONTACT LIST

Appendix B
OUTSIDE AGENCY CONTACT LIST

1. Lower Pioneer Valley Regional Planning Commission
   West Springfield, Massachusetts
   Mr. Chris Curtis
   413/781-6045

2. Massachusetts Natural Heritage Program
   Boston, Massachusetts
   Mr. Bruce Sorrie
   617/727-3160

3. University of Massachusetts
   Amherst, Massachusetts
   W. P. MacConnell
   413/545-2766

4. Massachusetts Division of Fisheries and Wildlife
   Boston, Massachusetts
   Mr. Brad Blodgett
   617/366-9470

5. Massachusetts Municipal Wholesale Electric Company
   Ludlow, Massachusetts
   Mr. Craig Horneck
   413/589-0141

6. Department of Environmental Quality Engineering
   Division of Hazardous Waste, Regional Office
   Springfield, Massachusetts
   Mr. Paul H. Kwiatkowski
   413/785-5327

7. U.S. Environmental Protection Agency, Region I
   Office of Uncontrolled Sites
   Boston, Massachusetts
   Mr. John Hackler
   617/223-3468

8. U.S. Environmental Protection Agency, Region I
   Legal Review Section, Enforcement Division
   Boston, Massachusetts
   Mr. Stan Silverman
   617/223-5600

9. U.S. Environmental Protection Agency, Region I
   Federal Agencies Regional Coordinator
   Boston, Massachusetts
   Mr. Dave Pickman
   617/223-0967

10. U.S. Geological Survey
    Boston, Massachusetts
    Mr. Mike Frampton
    617/223-2822

11. Department of Environmental Quality Engineering
    Division of Water Pollution Control, Regional Office
    Amherst, Massachusetts
    413/549-1755

Appendix C
WESTOVER AFB RECORDS SEARCH INTERVIEW LIST

Appendix C
WESTOVER AFB RECORDS SEARCH INTERVIEW LIST

Interviewee	Area of Knowledge	Years at Installation
1	Civil Engineering	20
2	Civil Engineering	31
3	Civil Engineering	34
4	Fire Department	20
5	Bioenvironmental Engineering	7
6	Liquid Fuels Maintenance	20
7	Liquid Fuels Maintenance	15
8	Water and Wastewater Treatment	24
9	Water and Wastewater Treatment	27
10	DPDO	33
11	Roads & Ground Maintenance	34
12	Roads & Grounds Maintenance	42
13	Roads & Grounds Maintenance	33
14	Entomology	24
15	Civil Engineering Operations & Maintenance	23
16	Refuse Collection and Disposal	25
17	Refuse Collection and Disposal	28
18	Refuse Collection and Disposal	35
19	Real Property	19
20	Judge Advocate's Office	7
21	Explosive Ordance Disposal	--
22	Bioenvironmental Engineering	2

Appendix D
INSTALLATION HISTORY

Appendix D
INSTALLATION HISTORY

On September 15, 1939, 15 days after Hitler's Nazi forces attacked Poland, the City of Chicopee, Massachusetts, was selected to be the site for the Northeast Army Air Base. The 7-1/2-square-mile plot of "tobacco land" within the boundries of Chicopee was purchased for $2,070,918. On Army Day, April 6, 1940, the official groundbreaking and dedication ceremonies took place at the site. In keeping with Air Corps tradition of naming Army airfields in honor of departed heroes, the Chicopee military facility was named Westover Field in memory of Major General Oscar Westover.

During the early 1940's, Westover became a hub of military activities, serving as a training center for fighter pilots and anti-submarine crews. The airfield also played a major role during World War II as a staging area and combat training center for B-17, B-24, and B-26 bomber crews.

In February 1946, Westover Field was taken over by the Eastern Headquarters of the Air Transport Command. In January 1948, as the result of the National Security Act, which established the United States Air Force as a separate military service branch, the Airfield's designation was officially changed to "Westover Air Force Base." On June 1, 1948, the Air Force's Air Transport Command (ATC) merged with the Navy's Naval Air Transport Service (NATS) to form the Military Air Transport Service (MATS). Due to the Soviet blockade of Berlin, MATS' first assignment came quickly. The Berlin emergency airlift plan "Operation Vittles" started the last week of June and lasted for 327 days. Westover AFB was swiftly transformed into a major staging area under Operation Vittles. C-54s and Navy R5Ds flew

planeloads of food, coal, petroleum, and other supplies to the 2 million people of West Berlin. During the Korean conflict of the early 1950's, once again Westover's aircraft and crews were dispatched to the forefront of action, providing airlift operations for the American military forces fighting in Korea. Years later in January 1966, MATS became the Military Airlift Command (MAC).

A new era for Westover began on April 1, 1955 when the Strategic Air Command assumed control of the base. Shortly thereafter SAC's most renowned combat element, the Eighth Air Force, moved its headquarters to Westover. During the early 1960's, the Eighth Air Force maintained a mixed contingent of bombers, tankers, and fighters at Westover. The installation developed rapidly into the largest SAC facility in the eastern United States, with more than 10,000 military and nearly 700 civilian personnel.

During the early 1960's the situation in Vietnam intensified as did the United States commitment to the South Vietnamese. In June of 1966, Westover sent all 35 of its B-52s as well as its entire squadron of KC-135s to Southeast Asia on a temporary aerial combat duty assignment. In addition to air crews, another 2,500 Westover Air Force personnel were sent in support capacities of maintenance, transportation, security, supply, and administration. Westover was also involved in the massive airstrike in December 1972. B-52s from Westover joined other aircraft in the full-scale bombing of the Hanoi-Haiphong area described by some as, "one of the severest aerial assaults in all of history." By January 23, 1973, an agreement for a formal cease-fire had finally been reached. As of April 1, 1974, the active duty role of Westover came to an end and on May 1, 1974, the base officially became one of the 13 facilities whose prime operating responsibility rested with the Air Force Reserve units.

PRIMARY MISSION

Westover AFB is operated and maintained by the 439th Combat Support Group (CSG). The mission of the 439th CSG is extremely diverse and includes: direction, maintenance, and supervision of airfield activities, including base operations; operation of on-base transportation services and equipment; operation of fire-fighting and security services; operation of the military consolidated base personnel office and central civilian personnel office, and conduct of other support functions.

The 439th Tactical Airlift Wing (TAW) is the host unit at Westover AFB. The mission of the 439th TAW is to organize, recruit, and train Air Force reservists while maintaining operationally ready aircraft, crews, and support personnel. The major elements of operational readiness are the tactical aircraft, air drop of troops, supplies, and equipment, and aeromedical evacuation.

BASE ORGANIZATIONS

The major organizations and tenants at Westover AFB and their missions are summarized below:

731st and 337th Tactical Airlift Squadrons (Reserve)

The mission of these squadrons is to provide tactical airlift for airborne forces, their equipment, and supplies, and to maintain worldwide employment of the C-130B weapons system, including air evacuation and long-range movement of personnel, equipment, and supplies.

901st and 905th Consolidated
Aircraft Maintenance Squadrons (Reserve)

The mission of these squadrons is to support the primary training mission by keeping Westover's aircraft flying. The maintenance function is broken down into three branches: field maintenance, organizational maintenance, and avionics maintenance.

58th and 59th Mobile Aerial Port Squadrons (Reserve)

The mission of these squadrons is to support the 439th Tactical Airlift Wing's training requirements as well as the needs of the Military Airlift Command. Personnel of these squadrons are trained in the handling of air cargo from pickup point to the flight out.

901st and 905th Mobile Aerial Port Flights (Reserve)

The mission of these flights is the preparation of air cargo loads for air delivery by Westover's C-123 and C-130 aircraft.

74th Aeromedical Evacuation Squadron (Active U.S. Army Tenant)

The mission of this squadron is to train medical evacuation flight crews and aeromedical evacuation control center personnel.

439th Tactical Hospital (Reserve)

The mission of the 439th Tactical Hospital is to provide trained personnel to maintain a sustained medical operation for a limited period. In the event of mobilization, hospital specialists are operationally ready to move to locations as needed.

901st and 905th Mobility Support Flights (Reserve)

The mission of the mobility flights is to train with personnel of various base functions in order to be ready in the event of mobilization. The various base functions include: base supply, refueling, transportation, food service, and disaster preparedness.

901st and 905th Communications Flights (Reserve)

The mission of these flights is to provide trained communications-electronics personnel to perform staff, operations, and maintenance functions in support of the 439th TAW.

901st Civil Engineering Squadron
and the 905th Civil Engineering Fleet (Reserve)

Both the squadron and the fleet are comprised of Air Force reservists within the career fields of: construction equipment operators; pavement technicians; site development technicians; inventory management specialists; plumbers, carpenters, and refrigeration/heating specialists. Personnel would perform such wartime duties as: rapid-runway, bomb damage, and building repair.

901st and 905th Weapons Systems Security Flights (Reserve)

Personnel in these flights are trained combat defense forces. Their mission is to protect the base resources from sabotage, enemy ground attack, and other acts of hostility. Personnel perform guardianship duty over Westover's runways and perimeter, as well as assigned and transient aircraft.

Detachment 5, 1st Aerospace Communications Group (Active)

The Group's mission at Westover is to maintain radio communications equipment supporting the SAC command and control system through a giant talk station. The talk system provides support for tactical operations and long-range SAC command control of reconnaissance and other special aircraft missions.

Operating Location B, Detachment 6
26th Weather Squadron, 3rd Weather Wing (Active)

This unit's mission is to operate Westover's weather station and support flying activities by furnishing local weather observations, weather warnings, forecasts, and personalized service.

1917th Communications Squadron (Active)

This squadron is divided into an operations section, maintenance section, and a communications electronics branch. The squadron's overall responsibilities are to provide programming, operation, and maintenance of all communications systems; to provide switchboard operations, cryptographic, and communications center operations; and to provide continuous hands-on training to personnel of the 901st and 905th communications flights.

Appendix E
MASTER LIST OF INDUSTRIAL OPERATIONS

Appendix E
MASTER LIST OF INDUSTRIAL ACTIVITIES

Name	Present Location and Dates (Bldg. No.)	Past Location and Dates (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Treatment/Storage/Disposal
439 CSG					
Carpentry Shop	5306/1942-Pres.		X		
Liquid Fuels Maintenance	5310/1942-Pres.		X	X	DPDO and/or Fire Training
Protective Coatings	5307/1942-Pres.		X		
Electric Generator Shop	5312/1942-Pres.		X	X	DPDO
Refrigeration	5310/1942-Pres.		X	X	b
Pest Control	5307/1977-Pres.	3400/1952-1977	X		
Refueling Vehicle	2425/1977-Pres.	7067/1941-1977			
Vehicle Maintenance	7073/1941-Pres.				
Heating Plant	1411/1941-Pres.		X		
439 TAW					
Avionics Shop	2426/1960-Pres.		X		
Aircraft Maintenance	7073/1941-Pres.		X	X	DPDO
Corrosion Control	7051/1956-Pres.		X	X	IWTP to Sanitary Sewer [a]
Propulsion Shop	7071/1941-Pres.		X	X	DPDO
Battery Shop	7072/1942-Pres.		X	X	Neutralization/Leaching Pit

Appendix E--Continued

Name	Present Location and Dates (Bldg. No.)	Past Location and Dates (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Treatment/Storage/Disposal
Fuel Systems	7051/1980-Pres.	7067/1941-1980	X	X	DPDO
Pneudraulics	7072/1941-Pres.		X	X	DPDO
Wheel & Tire Shop	7072/1941-Pres.		X	X	IWTP to Sanitary Sewer [a]
Aerospace Ground Equipment (AGE)	7057/1977-Pres.	7071/1941-1977	X	X	DPDO
Non-Destructive Inspection	2426/1972 Pres.	Nosedock 10/ 1960-1972	X	X	IWTP to Sanitary Sewer [a]
Air Force Special Products Production Facility	1900/1955-1976		X	X	Sanitary Sewer [a]
Fire Department Training	7053/1974-Pres.	1520/1941-1974	X	X	Fire Training
Dental Clinic	5600/1956-1974				
Structural Repair Shop	7000/1956-Pres.				
Demineralizer	7400/1952-Pres.				
Sewage Treatment Plant	5331/1941-1970				
Industrial Waste Treatment Plant	7052/1956-Pres.			X	Effluent to Sanitary Sewer [a]

[a]Sanitary sewer discharged to the base sewage treatment plant until it was shut down in 1970; after 1970, sanitary sewer was connected to the City of Chicopee sanitary sewer system.
[b]Information not available.

Appendix F
INVENTORY OF EXISTING FUEL STORAGE TANKS

Appendix F
INVENTORY OF EXISTING FUEL STORAGE TANKS

Facility No.	Type POL	No. of Tanks	Capacity per Tank (gal)	Above/Below Ground	Diked
1306	MOGAS	3	5,200	Below	--
1411	Heating Fuel		1,500	In Plant	--
Near Building 1831	Diesel		12,000	Below	--
1832	Heating Fuel		1,000	Below	--
1833	Waste POL	2	4,000	Below	--
2200	Heating Fuel		5,000	Below	--
2201	Heating Fuel		5,000	Below	--
2504	Heating Fuel		420,000	Above	Yes
5100	Heating Fuel		20,000	Below	--
5200	Heating Fuel		3,000	Below	--
5304	Heating Fuel		550	Below	--
5305	Heating Fuel		1,000	Below	--
5306	Heating Fuel		2,000	Below	--
6645	Heating Fuel		5,000	Below	--
7052	Waste POL		6,000	Below	--
7700	JP-4	4	50,000	Below	--
7701	JP-4	2	50,000	Below	--
	AVGAS	2	50,000	Below	--
9000	Heating Fuel		1,000	Below	--
9200	Heating Fuel		6,000	Below	--

Appendix G
ABANDONED FUEL TANK LOCATION SUMMARY

Appendix G
ABANDONED FUEL TANK LOCATION SUMMARY

Facility No.	Type Fuel	No. of Tanks	Capacity per Tank (gal)	Type Tank
1601	MOGAS		20,000	Underground
Aqua System (near Bldg. 2502, 2503)	AVGAS	16	25,000	Underground
Near Bldg. 2500	Oil	3	11,000	Underground
Fire Training Area	Waste POL		2,000	Aboveground

Appendix H
REPORTED PESTICIDE USAGE ON WESTOVER AFB

Appendix H
REPORTED PESTICIDE USAGE ON WESTOVER AFB

Trade Name	Target Pest(s)	Site Identification	Area Covered/ Application	Number of Applications/ Year	Time of Year
Malathion	Aphids	Residential/Industrial Building Sites	5 Acres	Five	June, July, & August
	Flies	Outdoors, Dumpster Areas, Picnic Areas	2 Acres	Bi-Weekly	Spring, Summer, & Fall
	Cockroaches	Food Facilities	87,120 sf	Four	All Months
	Mosquitoes	Wooded Areas	500 Acres	Bi-Weekly	Spring, Summer, & Fall
D-Tox 4 E	Bees, Wasps, & Hornets	Outdoors Adjacent to Nesting Areas	As Required	As Required	Late Spring, Summer, & Fall
	Cockroaches	Food Facilities	87,120 sf	Four	All Months
	Ants	Various	As Required	As Required	All Months
	Spiders	Warehouses	As Required	Annually	All Months
	Silverfish	Boiler Plant, Suana Room at Gym	As Required	Three	May, July, & September
Diazinon	Cockroaches	Food Facilities	10,000 sf	Four	January, April, August, & October
Dursban "M"	Cockroaches	Food Facilities	10,000 sf	Four	All Months
Eaton's A-C Formula 50	Rats	Storage Facilities	50 Bait Stations	As Required	All Months
Sevin	Ants	Various	As Required	As Required	May-October
	Japanese Beetle	Various	10 Acres	Weekly	July & August
	Gypsy Moth	Wooded Areas	100 Acres	Bi-Weekly	May & June
Chlordane	Termites	Susceptible Wooden Structures	As Required	As Required	May-October
Penta-WR	Termites	Susceptible Wooden Structures	As Required	As Required	All Months
Japonex	Japanese Beetle	Turf Area	10 Acres	One	April-November

Appendix I
INVENTORY OF OIL/WATER SEPARATION PRETREATMENT FACILITIES

Appendix I
INVENTORY OF OIL/WATER SEPARATION PRETREATMENT FACILITIES

Location	Description	Date of Installation	Discharge
7052	Oil/Water Separator at the IWTP	1956	Sanitary Sewer
7615	Airfield Oil/Water Separator	1971	Cooley Brook
7917	Airfield Oil/Water Separator	1971	Cooley Brook
7921	Airfield Oil/Water Separator	1971	Cooley Brook

Appendix J
HAZARD ASSESSMENT RATING METHODOLOGY

USAF INSTALLATION RESTORATION PROGRAM
HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

The Department of Defense (DOD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DOD facilities. One of the actions required under this program is to:

> "develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts." (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

The first site rating model was developed in June 1981 at a meeting with representatives from USAF Occupational Environmental Health Laboratory (OEHL), Air Force Engineering Services Center (AFESC), Engineering-Science (ES) and CH_2M Hill. The basis for this model was a system developed for EPA by JRB Associates of McLean, Virginia. The JRB model was modified to meet Air Force needs.

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of USAF OEHL, AFESC, various major commands, Engineering Science, and CH_2M Hill met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air Force in setting priorities for follow-on site investigations and confirmation work under Phase II of IRP.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DOD program needs.

The model uses data readily obtained during the Record Search portion (Phase I) of the IRP. Scoring judgments and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards at the site. This approach meshes well with the policy for evaluating and setting restrictions on excess DOD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1). The site rating form is provided in Figure 2 and the rating factor guidelines are provided in Table 1.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: the possible receptors of the contamination the waste and its characteristics, potential pathways for waste contaminant migration, and any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating.

The receptors category rating is calculated by scoring each factor, multiplying by a factor weighting constant and adding the weighted scores to obtain a total category score.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned and for direct evidence 100 points are assigned. If no evidence is found, the highest score among three possible routes is used. These routes are surface water migration, flooding, and ground-water migration. Evaluation of each route involves factors associated with the particular migration route. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The scores for each of the three categories are then added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Sites at which there is no containment are not reduced in score. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste managment practices category factor to the sum of the scores for the other three categories.

SITE RATING METHODOLOGY FLOW CHART

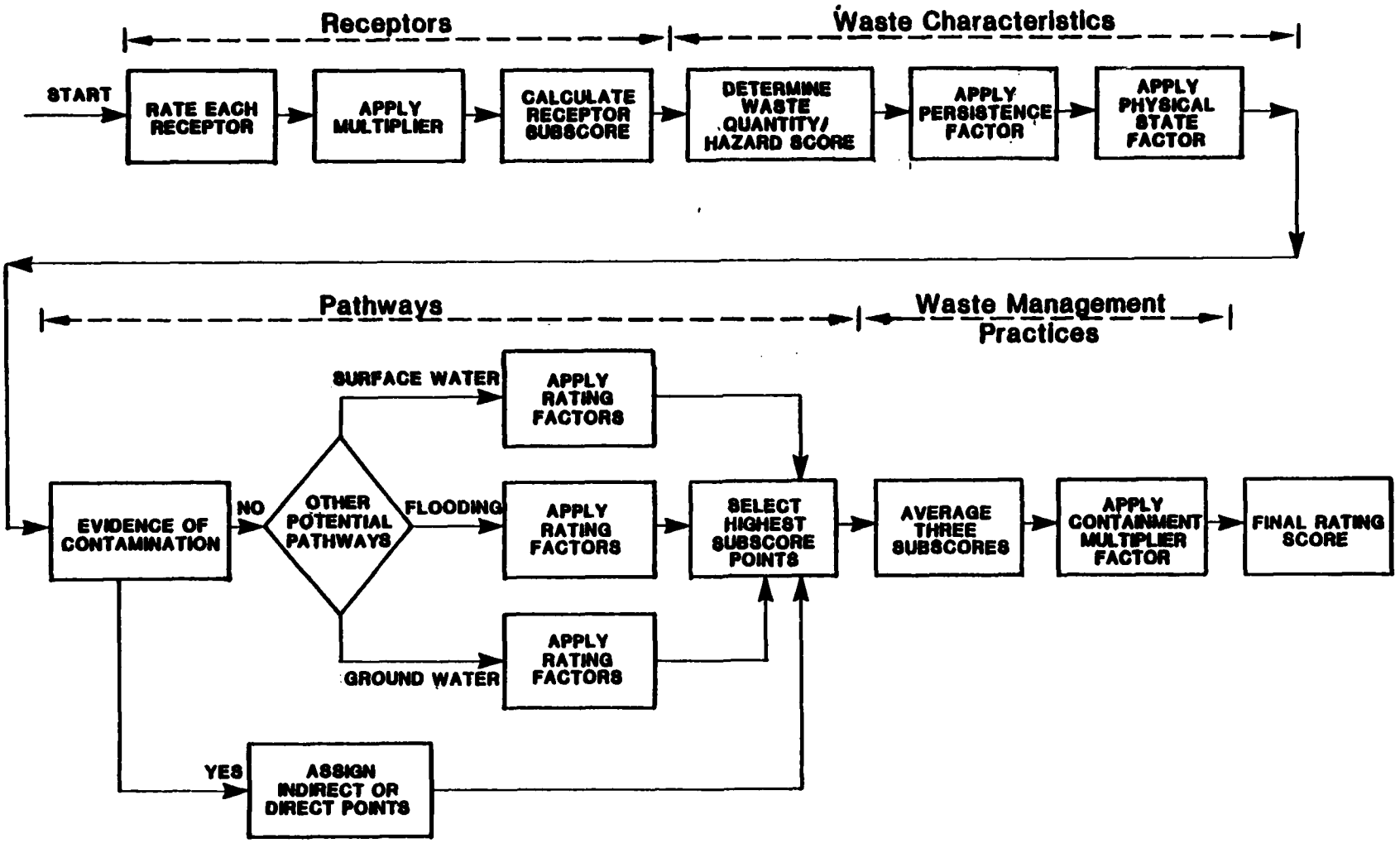

FIGURE 1

FIGURE 2

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE _____

LOCATION _____

DATE OF OPERATION OR OCCURRENCE _____

OWNER/OPERATOR _____

COMMENTS/DESCRIPTION _____

SITE RATED BY _____

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to reservation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	_____	_____

Receptors subscore (100 X factor score subtotal/maximum score subtotal) _____

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) _____
2. Confidence level (C = confirmed, S = suspected) _____
3. Hazard rating (H = high, M = medium, L = low) _____

Factor Subscore A (from 20 to 100 based on factor score matrix) _____

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

_____ X _____ = _____

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

_____ X _____ = _____

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore _____

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals	_____	_____

Subscore (100 X factor score subtotal/maximum score subtotal) _____

2. Flooding

Flooding		1		

Subscore (100 x factor score/3) _____

3. Ground-water migration

Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals	_____	_____

Subscore (100 x factor score subtotal/maximum score subtotal) _____

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore _____

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors _____
Waste Characteristics _____
Pathways _____

Total _____ divided by 3 = _____
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

_____ X _____ = [ ]

TABLE 1

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels				Multiplier
	0	1	2	3	
A. Population within 1,000 feet (includes on-base facilities)	0	1 - 25	26 - 100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	3
D. Land Use/Zoning (within 1 mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	6
E. Critical environments (within 1 mile radius)	Not a critical environment	Natural Areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination.	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands.	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use.	Recreation, propagation and management of fish and wildlife.	Shellfish propagation and harvesting.	Potable water supplies	6
G. Ground-Water use of uppermost aquifer	Not used, other sources readily available.	Commercial, industrial, or irrigation, very limited other water sources.	Drinking water, municipal water available.	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available.	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1 - 50	51 - 1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1 - 50	51 - 1,000	Greater than 1, 000	6

TABLE 1 (Continued)

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES (Cont'd)

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records.
- o Knowledge of types and quantities of wastes generated by shops and other areas on base.
- o Based on the above, a determination of the types and quantities of waste disposed of at the site.

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records.
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site.

A-3 Hazard Rating

Hazard Category	Rating Scale Levels			
	0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

TABLE 1 (Continued)

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES (Cont'd)

II. WASTE CHARACTERISTICS (Continued)

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:
Confidence Level
- o Confirmed confidence levels (C) can be added
- o Suspected confidence levels (S) can be added
- o Confirmed confidence levels cannot be added with suspected confidence levels

Waste Hazard Rating
- o Wastes with the same hazard rating can be added
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

TABLE 1 (Continued)

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES (Cont'd)

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 POTENTIAL FOR SURFACE WATER CONTAMINATION

Rating Factor	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 in.	-10 to + 5 in.	+5 to +20 in.	Greater than +20 in.	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1 year 24-hr rainfall	<1.0 inch	1.0-2.0 inches	2.1-3.0 inches	>3.0 inches	8
B-2 POTENTIAL FOR FLOODING					
Floodplain	Beyond 100-year floodplain	In 25-year floodplain	In 10-year floodplain	Floods annually	1
B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION					
Depth to ground water	Greater than 500 ft	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsidence fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

TABLE 1 (Continued)

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES (Cont'd)

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. WASTE MANAGEMENT PRACTICES FACTOR

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Fire Proection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1 or III-B-3, then leave blank for calculation of factor score and maximum possible score.

Appendix K
SITE RATING FORMS

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE SITE No.1, SANITARY LANDFILL B
LOCATION WESTOVER AFB
DATE OF OPERATION OR OCCURRENCE 1960 → 1974
OWNER/OPERATOR WESTOVER AFB
COMMENTS/DESCRIPTION GENERAL BASE REFUSE AND INDUSTRIAL REFUSE
SITE RATED BY GREG MCINTYRE

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	2	10	20	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	119	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 66

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

80 x 1.0 = 80

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	—
B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface water migration				
Distance to nearest surface water	1	8	8	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	34	108
		Subscore (100 X factor score subtotal/maximum score subtotal)		31
2. Flooding	0	1	0	100
		Subscore (100 x factor score/3)		0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	N/A	8	—	—
		Subtotals	52	90
		Subscore (100 x factor score subtotal/maximum score subtotal)		58
C. Highest pathway subscore.				
Enter the highest subscore value from A, B-1, B-2 or B-3 above.				
			Pathways Subscore	58

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	66
Waste Characteristics	80
Pathways	58
Total 204 divided by 3 =	68
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

68 x 1.0 = **68**

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE SITE No.2, SANITARY LANDFILL A
LOCATION WESTOVER AFB
DATE OF OPERATION OR OCCURRENCE 1958 - 1960
OWNER/OPERATOR WESTOVER AFB
COMMENTS/DESCRIPTION GENERAL BASE REFUSE
SITE RATED BY GREG McINTYRE

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	2	10	20	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	119	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 66

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore —

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	50	108

Subscore (100 X factor score subtotal/maximum score subtotal) 46

2. Flooding

	0	1	0	100

Subscore (100 x factor score/3) 0

3. Ground-water migration

Depth to ground water	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	2	8	16	24
Direct access to ground water	N/A	8	—	—
		Subtotals	68	90

Subscore (100 x factor score subtotal/maximum score subtotal) 76

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 76

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 66
Waste Characteristics 40
Pathways 76

Total 182 divided by 3 = 61
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

61 x 1.0 = 61

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE SITE No. 3, "CHRISTMASS TREE" FIRE TRAINING AREA
LOCATION WESTOVER AFB
DATE OF OPERATION OR OCCURRENCE 1950'S - 1964
OWNER/OPERATOR WESTOVER AFB
COMMENTS/DESCRIPTION USED FOR FIRE DEPT. TRAINING EXERCISES
SITE RATED BY GREG MCINTYRE

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	2	10	20	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	97	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 54

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore —

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	42	108

Subscore (100 X factor score subtotal/maximum score subtotal) 39

2. Flooding

Flooding	0	1	0	100

Subscore (100 x factor score/3) 0

3. Ground-water migration

Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	N/A	8	—	—
Direct access to ground water	N/A	8	—	—
		Subtotals	44	66

Subscore (100 x factor score subtotal/maximum score subtotal) 67

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 67

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 54
Waste Characteristics 48
Pathways 67

Total 169 divided by 3 = 56 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

56 x 1.0 = 56

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE SITE No. 4, RADIOACTIVE WASTE SITE
LOCATION WESTOVER AFB
DATE OF OPERATION OR OCCURRENCE EARLY 1950's
OWNER/OPERATOR WESTOVER AFB
COMMENTS/DESCRIPTION DISPOSAL OF LOW LEVEL RADIOACTIVE ELECTRON TUBE
SITE RATED BY GREG MCINTYRE

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	2	10	20	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	119	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 66

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) L

Factor Subscore A (from 20 to 100 based on factor score matrix) 30

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

30 x 1.0 = 30

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

30 x 0.50 = 15

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore —

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	42	108

Subscore (100 X factor score subtotal/maximum score subtotal) 39

2. Flooding

Flooding	0	1	0	100

Subscore (100 x factor score/3) 0

3. Ground-water migration

Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	N/A	8	—	—
		Subtotals	52	90

Subscore (100 x factor score subtotal/maximum score subtotal) 58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 58

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 66
Waste Characteristics 15
Pathways 58

Total 139 divided by 3 = 46
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

46 x 0.95 = 44

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE SITE NO. 5, NORTH FIRE TRAINING AREA
LOCATION WESTOVER AFB
DATE OF OPERATION OR OCCURRENCE 1950'S INTERMITTENT USE
OWNER/OPERATOR WESTOVER AFB
COMMENTS/DESCRIPTION USED FOR FIRE DEPT. TRAINING EXERCISES
SITE RATED BY GREG McINTYRE

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	2	10	20	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	113	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 63

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

40 X 0.8 = 32

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

32 X 1.0 = 32

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore —

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
Subtotals			42	108

Subscore (100 X factor score subtotal/maximum score subtotal) 39

2. Flooding

	0	1	0	100

Subscore (100 x factor score/3) 0

3. Ground-water migration

Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	N/A	8	—	—
Direct access to ground water	N/A	8	—	—
Subtotals			44	66

Subscore (100 x factor score subtotal/maximum score subtotal) 67

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 67

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 63
Waste Characteristics 33
Pathways 67

Total 162 divided by 3 = 54 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

54 x 1.0 = 54

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE SITE No. 6, SEWAGE TREATMENT PLANT AREA
LOCATION WESTOVER AFB
DATE OF OPERATION OR OCCURRENCE 1941 – 1971
OWNER/OPERATOR WESTOVER AFB
COMMENTS/DESCRIPTION SMALL QUANTITY OF CYANIDE, 30 YD^3 OF ASBESTOS
SITE RATED BY GREG McINTYRE

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	93	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 52

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 X 1.0 = 60

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

60 X 0.50 = 30

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore —

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	50	108

Subscore (100 X factor score subtotal/maximum score subtotal) 46

2. Flooding

Flooding	0	1	0	100

Subscore (100 x factor score/3) 0

3. Ground-water migration

Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to ground water	N/A	8	—	—
		Subtotals	44	90

Subscore (100 x factor score subtotal/maximum score subtotal) 49

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 49

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 52
Waste Characteristics 50
Pathways 49

Total 131 divided by 3 = 44
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

44 x 1.0 = 44

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE SITE No. 7, FACILITY 1900 LEACHING PIT
LOCATION WESTOVER AFB
DATE OF OPERATION OR OCCURRENCE 1955 - 1976
OWNER/OPERATOR WESTOVER AFB
COMMENTS/DESCRIPTION DISPOSAL OF WASTE ACIDS
SITE RATED BY GREG MCINTYRE

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	103	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 57

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

40 x 0.40 = 16

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

16 x 1.0 = 16

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	—
B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface water migration				
Distance to nearest surface water	1	8	8	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	34	108
		Subscore (100 X factor score subtotal/maximum score subtotal)		31
2. Flooding	0	1	0	100
		Subscore (100 x factor score/3)		0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to ground water	N/A	8	—	—
		Subtotals	44	90
		Subscore (100 x factor score subtotal/maximum score subtotal)		49
C. Highest pathway subscore.				
Enter the highest subscore value from A, B-1, B-2 or B-3 above.				
			Pathways Subscore	49

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	57
Waste Characteristics	16
Pathways	49
Total 122 divided by 3 =	41
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

41 x 1.0 = **41**

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE SITE No. 8, CURRENT FIRE TRAINING AREA
LOCATION WESTOVER AFB
DATE OF OPERATION OR OCCURRENCE 1964 - PRESENT
OWNER/OPERATOR WESTOVER AFB
COMMENTS/DESCRIPTION USED FOR FIRE DEPT. TRAINING EXERCISES
SITE RATED BY GREG MCINTYRE

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	99	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 55

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	—
B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface water migration				
Distance to nearest surface water	1	8	8	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	34	108
		Subscore (100 X factor score subtotal/maximum score subtotal)		31
2. Flooding	0	1	0	100
		Subscore (100 x factor score/3)		0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	N/A	8	—	—
Direct access to ground water	N/A	8	—	—
		Subtotals	44	66
		Subscore (100 x factor score subtotal/maximum score subtotal)		67
C. Highest pathway subscore.				
Enter the highest subscore value from A, B-1, B-2 or B-3 above.				
			Pathways Subscore	67

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors			55
Waste Characteristics			48
Pathways			67
Total	170	divided by 3 =	57
			Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

57 x 1.0 = 57

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE SITE No. 11, BATTERY SHOP LEACHING PIT
LOCATION WESTOVER AFB
DATE OF OPERATION OR OCCURRENCE 1942 - PRESENT
OWNER/OPERATOR WESTOVER AFB
COMMENTS/DESCRIPTION DISPOSAL OF NEUTRALIZED WASTE ACIDS
SITE RATED BY GREG McINTYRE

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	97	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 54

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 x .40 = 24

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

24 x 1.0 = 24

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	—
B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface water migration				
Distance to nearest surface water	1	8	8	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	34	108
		Subscore (100 X factor score subtotal/maximum score subtotal)		31
2. Flooding	0	1	0	100
		Subscore (100 x factor score/3)		0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to ground water	N/A	8	—	—
		Subtotals	44	90
		Subscore (100 x factor score subtotal/maximum score subtotal)		49
C. Highest pathway subscore.				
Enter the highest subscore value from A, B-1, B-2 or B-3 above.				
			Pathways Subscore	49

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 54
Waste Characteristics 39
Pathways 49

Total 127 divided by 3 = 42 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

42 x 1.0 = 42

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE SITE NO. 15, INDUSTRIAL WASTE TREATMENT PLANT
LOCATION WESTOVER AFB
DATE OF OPERATION OR OCCURRENCE 1956 - PRESENT
OWNER/OPERATOR WESTOVER AFB
COMMENTS/DESCRIPTION SUSPECTED LEAKING POL WASTE STORAGE TANK
SITE RATED BY GREG McINTYRE

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	97	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 54

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

40 x 0.8 = 32

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

32 x 1.0 = 32

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore —

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	1	8	8	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	34	108

Subscore (100 X factor score subtotal/maximum score subtotal) 31

2. Flooding | 0 | 1 | 0 | 100

Subscore (100 x factor score/3) 0

3. Ground-water migration

Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to ground water	N/A	8	—	—
		Subtotals	44	90

Subscore (100 x factor score subtotal/maximum score subtotal) 49

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 49

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 54
Waste Characteristics 46
Pathways 49

Total 135 divided by 3 = 45 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

45 x 1.0 = 45

Appendix L
PHOTOGRAPHS

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FIGURE L-1. Site No. 1—Sanitary Landfill B. This photograph shows evidence of recent heavy equipment activity.

FIGURE L-2. Site No. 1—Sanitary Landfill B. This photograph shows standing water adjacent to the southern boundary of landfill.

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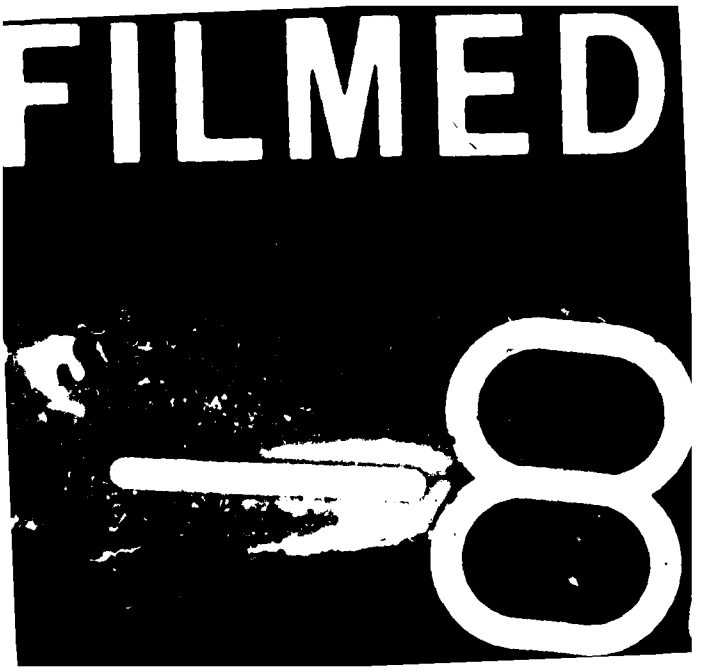
FIGURE L-3. Site No. 1—Sanitary Landfill B. This photograph shows evidence of recent dumping activity and inadequate cover.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